Competence, Education, Professional Development, Psychology, and Socio-Cybernetics

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Abstract

What is the source of the widespread feeling that many professionals have not behaved professionally? Not usually a deficit in techno-rational knowledge (although such presumed deficits are precisely what is targeted in most attempts to fix the problem). More often the problem has been failure to build up a personal store of relevant up-to-date specialist knowledge. Still more often it stems from deficits in *tacit* knowledge … (unverbalised) knowledge of ways of *doing* things. But most often it stems from a failure to consider the wider needs of clients and a disregard of the consequences of rule-bound actions grounded solely in disciplinary knowledge. In other words, by failure to engage with issues which lie *outside* the individual's domain of specialist knowledge. In such a context, the concept of certifiable professional competence becomes an oxymoron.

The problem in psychology is exacerbated by the fact that many widely accepted thoughtways and procedures have serious shortcomings. As a result, many actions based upon them have undesirable consequences for individuals, institutions, and society. They must therefore be considered unethical.

For these reasons, seeking to restrict the actions of professionals to those which fall within a domain of certifiable techno-rational competence, and requiring them to regularly update that knowledge, is dangerous. More helpful might be a requirement to demonstrate that one has, in one way or another, contributed to the development of the profession.

This chapter addresses issues having to do with the competence and professional development of people working with human resources in such areas as education and organisational and public management.

It is based on research that my colleagues and I have conducted in homes, schools, workplaces, and public management over the past half century.

My basic theme is that our technico-rational knowledge of such things as human development, the nature of competence, assessment, and management is so thin, and so heavily based on such inadequate and misleading – indeed damaging – models and procedures, that it would be a mistake to require people working in these areas to engage in "professional development" activities conceived of as involving such things as taking further courses. My own position is that, if it is felt that continuing professional development does need to be authenticated, what would be needed would be evidence of having *contributed to the development of the profession*. This would mean demonstrating that one had been doing such things as trying to influence the constraints that limit the effectiveness of psychologists, striving to develop new theoretical frameworks to handle previously neglected problems, and finding new ways of doing things. Doing any of these things would involve an ethical commitment to going well beyond the customary call of duty; doing things one does *not* know how to do. What would be required would be *professional* competence going well beyond what is currently considered to be one's area of certified technical competence.

An example may help to clarify the point. The word "education" comes from the Latin root "educere" … which means "to draw out". This implies – and most teachers, pupils, parents, and educational philosophers agree – that the primary task of an educator is to draw out the diverse talents of children, pupils, students, subordinates, other course participants, or apprentices. Yet most teachers don't do this. And they will point to many constraints which prevent them doing so. The conclusion is stark: They cannot be considered to be competent teachers unless they set about, personally and through their professional associations, seeking to influence those constraints. Yet most teachers don't do this, pointing to many constraints that prevent them from doing so. The conclusion is stark: They cannot be considered to be competent teachers unless they set about, personally and through their professional associations, seeking to influence those constraints. Yet most teachers will claim, first, that it not within their remit to seek to influence such constraints, second that they are not *able* … that is, they lack the competencies that are required …to do so, and, third, that such activity is actually proscribed by professional/legal regulations to the effect that they work *only* within their domain of certified specialist competence. Yet it follows from the observations already made that *not only can they not be considered to be competent professionals unless they reduce the constraints which prevent them doing in their classrooms the very things they most need to do, their most central claim – namely to be nurturing the competencies of their students – is belied by the understanding of competence revealed in their own thoughtways and behaviour.*

More pointedly, so far as this book is concerned: the deficits in teachers' understandings of human competence (including professional competence), its development and assessment, and the determination of behaviour more generally are, in large part, due to oversights *on the part of psychologists*. We have failed to provide teachers with appropriate concepts and tools in these areas. Setting out to develop these understandings and tools would require *psychologists* to engage in

activities going well beyond what is currently regarded as their domain of professional competence. Thus, paradoxically, psychologists cannot be considered to be professionals *unless* they do these things. This turns out to be a rather general problem. Its resolution hinges not merely on developing an understanding of the nature, development, assessment, and deployment of generic, high-level, transferable competencies but also those required (i.e., the societal understandings required) to assert *professional* competence.

To re-state and re-phrase this: *Competence as a psychologist depends, among other things, on setting out to understand and influence the wider social forces which have deflected research psychologists from some of the most important topics they should have been investigating. This involves working outwith their domain of certified technico-rational competence. More basically still, understanding the social forces which primarily control human behaviour must lie at the heart of any science which claims to be devoted to understanding and predicting human behaviour. Yet understanding these social forces has not, in the past, been seen as central to the mission of psychology.*

I will now explain how we have arrived at these unanticipated, and perhaps unwelcome, conclusions by summarising some of our research. This will include research we have undertaken to clarify educational objectives, the nature of competence, the development of competence in homes, schools and workplaces, the assessment of competence, the barriers which prevent the educational system delivering education (especially what we have come to call the socio-cybernetic processes involved), and the barriers which prevent us, as a society, taking the steps required to survive as a species.

Studies Designed to Clarify Educational Objectives

I begin by very briefly summarising – and thus necessarily over-stating – some results from a number of opinion surveys carried out among parents, pupils, teachers, 20-30 year old ex-pupils, and employers in many countries.

The overwhelming majority of those who were interviewed[1] thought that the main goals of education include developing such qualities as "The confidence and initiative required to introduce change" (actually, the most widely endorsed goal among our adolescent pupils), problem-solving ability, the ability to work with others, the ability to make one's own observations, the ability to communicate, leadership, and the ability to understand how organisations and society work and play an active part in them. More generally, they include helping people to develop and get recognition for, the diverse, often idiosyncratic, talents they possess. The objectives said to be most important do include helping people to acquire the credentials that appear to control entry to jobs, but the impact of this is tempered by widespread recognition that the formal knowledge on which such certificates are based is in reality *un*important[2].

The importance of these wider goals of education, often signalled by such phrases as "the development of the whole child", has been emphasised in curriculum documents from many countries[3]. They have also been emphasised in documents on vocational education. For example, the Manpower Services Commission[4] in Great Britain embarked on a vast *Technical and Vocational Education Initiative* (which was later extended to include Higher Education in general) which aimed to foster "initiative, problem-solving ability … creativity … the qualities which make for enterprise … and understanding of how society works". And they have been stressed for almost a century in the most widely cited books in teacher education – such as those by Dewey (1899), Kilpatrick (1918), and

Parker (1969). Some American school systems poured vast amounts of time and money into educational programmes which sought to foster such qualities (Fraley, 1981).

But, in fact, few schools do much work in these areas[5]. Goodlad (1983) made the point forcefully by saying that, in general, the activities in which most pupils are engaged for most of the time in most schools do not merit description as academic or intellectual: They fail to nurture such qualities as judgment, analytic ability, the ability to interpret, the ability to communicate, the ability to reconcile different points of view, or critical thinking. Since Goodlad wrote, the situation has become dramatically worse with the advent of high stakes testing and "quality assurance" procedures such as those offered by OFSTED[6] in the UK.

The quest to understand the reasons why schools generally neglect their main goals and what needs to be done to generate more appropriate arrangements forms the basis for much that will be said in this chapter.

Studies of Competence in Workplaces and Society

There are many reasons why it is important to ask whether the opinions summarised above are founded in reality. One is that it may well be argued that our competence as psychologists depends mainly on high-level competencies like those enumerated by parents, teachers, and students and that the focus in any professional development activities should therefore be on nurturing such competencies. Another is that the answer one gets to the question depends on the methodology employed in research seeking an answer … and this is often deficient for reasons which call into question many widely accepted practices.

In fact, numerous studies have shown that qualities like those mentioned are vital in workplaces and society. Many of the earlier studies are summarised in, Raven (1984/97), and Spencer and Spencer (1993). However, a few may be singled out for special mention here because they relate more directly to the theme of this chapter. These studies include those of Kanter (1985), Huff et al (1982), Klemp et al (1977), Klemp et al (1980), Taylor & Barron (1963), Price, Taylor, et al (1971), Schneider et al (1981), and Schön (1983, 2001). Lees (1996) has condensed studies of managerial competence into a remarkable Figure of direct relevance here and reproduced in Raven (2001d)[7].

In the course of hundreds of studies conducted using fine-grained methodology – and especially *Behavioural Event Interviewing* (a variant of Flanagan's *Critical Incident Technique*) – it has been shown that effective organisations call on even their "low-level" employees (lavatory attendants, machine operatives, bus drivers, sales people, etc.) to utilise high-level competencies. For example, a compilation of "effective" behaviours observed among machine operatives (Flanagan & Burns, 1955) included examples of them studying the way the organisation in which they worked functioned and working out for themselves what they should be doing – and doing it without having to be given instructions. However, as researchers like Kanter (1985), Schön (1983), and Cunningham (2001) have shown, even observations at this level fail to do justice to the diverse subtle contributions that people in effective organisations make to the emergent properties of problem-identification-and-solving networks[8] which, while crucial to the improvement and survival of the product, services, and organisation itself, are rarely discussed. These diverse contributions include not only intervening in the internal structure of the organisation (by, for example, getting together with colleagues to influence those above one) but also seeking to understand and influence external constraints and opportunities … such as those offered by the market or arising from the

operation of politico-bureaucratic systems. We will return to this later because it has assumed increasing importance as our work has progressed.

The issue of diversity is important. Taylor (Price, Taylor, et al.,1971; Taylor & Barron, 1963) showed that there are many different *types* of effective physician and scientist … and none of them are predicted by college grades. Occupational categories are particularly unhelpful. Psychologists, for example, do all sorts of different things (ranging from running countries and organisations through helping distressed individuals to designing educational programmes, editing journals, and thinking through serious conceptual issues). Such heterogeneous professional groupings are therefore perhaps best understood as sociological groupings which operate mainly to protect their members by erecting barriers to entry[9]. And indeed, as Steiner (1999) has shown, these entry requirements have been raised consistently without there being any significant change in the nature of the activities actually carried out by those who gain entry.

For the sake of completeness, it may also be mentioned that there have also been studies of the qualities which distinguish those employed in more successful and innovative firms from those employed in less innovative firms[10] and those which characterise the general populations, employees, and managers of more versus less rapidly developing economies[11]. And there have been investigations of the competencies possessed by more (versus less) effective citizens and of those which characterise the members of more (versus less) successful political systems[12].

A fairly consistent picture emerges: The qualities which make for effectiveness in life – both at work and outside – and those which result in economic, social, and personal development, are indeed those emphasised by many of those who have written about the goals or aims of education and those endorsed by most parents, pupils, teachers, employees, and employers in opinion surveys. And, as these groups also noted, the diversity of talent is enormous.

A couple of studies are of particular relevance here because they deal with *professional* competence.

One is Schön's (1983, 2001) study of how professionals think in action. He argues that the claim of *most* of those who describe themselves as professionals is without foundation. They do not live up to the norms and values they or their professional organisations espouse. He cites lawyers who have no real interest in justice or compassion, physicians who have little interest in the equitable distribution of quality health care, and scientists and engineers who care little about the beneficence and safety of their technologies.

He then goes on to examine the behaviour of some architects, designers, engineers, psychotherapists, and town planners whom he *would* be prepared to describe as professionals. They engage in activities going well beyond the boundaries of their job descriptions and engage with many issues which others would be inclined to overlook. To find ways forward, they engage in "experimental conversations with the problem" often re-defining it and extending its boundaries: The "real problems" lie *outside* the areas of technical competence that their training equipped them to handle. Yet they are crucial to their competence, and especially their claim to be professionals. Hence the importance of Schön's claim that what is needed is not technico-rational competence but 'the abilities required to deal with the swamp'… i.e. the competencies required to deal with situations in which the problems are unclear, messy, confused, and incapable of technical solution. Perhaps of particular interest here is these professional's engagement with *systems* processes. Whereas many of those working with societal problems (such as malnutrition) propose discipline-

based solutions drawing on the technical knowledge of their own particular discipline, the need is for systems-oriented understanding and intervention – which is to be sharply distinguished from 'multi-disciplinary' intervention based on independent inputs suggested by a variety of 'disciplines'.

Also of interest here is Hattie's (2009) meta analysis of more than 800 meta analyses of the contribution to pupil "achievement" (traditionally measured) of 138 variables widely considered to importantly determine school success. Despite the gross limitations of the input and outcome measures, Hattie's conclusion is that effective teachers are extraordinary people characterised by high levels of dedication and personal competence. One of the most important things they do is to continuously seek feedback from their pupils and use it to reconsider their goals and reflect on, and improve, the quality of their teaching. They study the barriers the pupils have encountered and, when they find that their own activities have not had the desired effect, restructure what they are doing so as to achieve their objectives. This stands in stark contrast to the more common interpretation of "feedback" – which tends to be viewed as feedback *to pupils* of some kind of mark or score unaccompanied by any attempt to understand and remedy the problems which have prevented the pupils "doing better" – i.e. arriving at "The Correct Answer".

The choice of the book's title *Visible Learning* reflects Hattie's observation that effective teachers discuss their objectives and procedures with their pupils … thereby making them visible. More than that, by discussing the barriers to achievement experienced by their pupils, they make the sources of their own competence and incompetence visible to their pupils in such a way that they can learn from them, as role models, how to be learners in the wider sense of that word.

At the heart of this shift in understanding of the educational process lies a move from thinking of the task of "teaching" as involving "telling" to thinking of it as "managing development".

But there is something else worth noting. In drawing these conclusions, Hattie did something which most reviewers of articles submitted to "professional" journals would reject. *His conclusions were not documented **in** the studies he reviewed. The studies contain no measures of these things! These insights emerged in the course of **reflecting on the implications** of the material reviewed.*

Another study that is of interest here is Adams and Burgess's (1989) study of teacher competence. Through an extended action-research process, they discovered that different teachers felt that they contributed in very different ways the process of schooling and education *conceived of as a whole*. Thus some teachers felt they had made a particular contribution to developing effective relationships with parents, others to getting the building improved, others to helping pupils with social difficulties, and so on. The *varieties* of teacher competence, physician competence, salesman competence, scientist competence, managerial competence and so on is something with which we, as psychologists, need to come to terms. There is something else about the Adams and Burgess study that is relevant to our argument in this chapter. Although it was centrally concerned with arrangements designed to promote the development of professional competence among teachers, the publishers discontinued sales because the higher education personnel who pose as experts on staff-appraisal and development systems (and earn their livelihoods by offering courses) chose to continue to promote systems through which performance is appraised against standards set by authority rather than devolved arrangements that would have resulted not only in more attention being paid to the needs of pupils and the public (who are not, of course, the patrons, paymasters or "customers" of the system) … and which would have led to the development and recognition of a wide variety of (professional) competencies among teachers. This is exactly the problem that I am

here arguing that we, as psychologists, have to face up to when considering "continuing professional development".

The studies mentioned above forcefully raise questions about the *criteria* to be applied when considering or assessing occupational and professional competence. One thing we have seen is that multiple and barely discussed contributions are required to create climates or cultures of enterprise or intelligence. Different people contribute in different ways and the talents required to make these contributions in an important sense do not exist outwith the context of complementary, if not congenial, contributions made by others.

<div align="center">Incompetence</div>

It would seem from what has been said that it would be far from inappropriate to, at this point, introduce some information on what pupils and ex-pupils have to say about the competence of their teachers. As we shall see, it has major implications for the way society tries to grapple with issues relating to professional competence.

In Goodlad's study, only English and mathematics were considered *important* by more than two-thirds of high school students – and that for the future, not the present. School subjects are boring: only art, physical education, and languages were rated as interesting by more than one-third of those taking them. These results again correspond with those obtained in studies carried out elsewhere[13]. More than half of the adolescents we interviewed said that more than half of their subjects were *both* boring and useless. They wanted schools to do more to achieve more than 90% of the objectives we asked them about. Bill et al. (1974) found that 98% of the random sample of high school students they interviewed felt they were failures at school.

The explanation of these bleak comments cannot be that young people have unduly high expectations or are negativistic. What they say about their schools compares very unfavourably with what their peers have to say about work. In our surveys, 80% of ex-pupils who had left school at the first opportunity said – after they had been at work for five years, and in response to three separate questions – that they liked their jobs, liked their employers, and found their jobs interesting. This was largely because – in contrast to the circumstances which prevailed at school – they could move themselves into positions in which they were able to do things they liked doing and were good at instead of being forced to do many things they did not like and were not good at. But it was also because they were able to take initiative and because making the most of themselves was appreciated. Grannis (1983), Bachman et al. (1978), and Flanagan (1978) obtained similar results in the United States. It is not, of course, true that all jobs are so satisfying. But even in the "worst" jobs – jobs in large manufacturing plants and large offices such as insurance companies – the levels of satisfaction only fell to around 60% … still much better than the levels recorded by pupils at school.

In this context it is not entirely irrelevant to note that Csikszentmihalyi and Le Fevre (1989) found that people's most important life satisfactions come from exercising personally important talents at the borders of their capability.

It emerges, therefore, that school work is actually the worst and least developmental work in our society … and that school environments are the least conducive to feelings of well-being.

Bachman et al. (1978) found that whereas only 13% of adolescents at school said they had had opportunities to identify and develop their talents, the proportion of young adults who said they had been able to do this at work was 80%. Tyler (in Flanagan 1978), commenting on what Flanagan's respondents – the Project Talent sample – had, at 30 years of age, said about the connection between education and work, observed that that the most logical conclusion one could draw was that schools should be closed down. This is, of course, exactly the conclusion Andersson (2001) drew from his own data in his book *Blow up the School*. Most of the employed adults we interviewed said that they had not at school learned things which were useful in their jobs or in their leisure, although a significant proportion of those who found their way into middle class (but not working class) occupations did say that their education had helped them to *get* a good job.

What are the implications of these findings for the professional competence of teachers and psychologists? It can hardly be considered *ethical* to keep so many for so long in such environments. It is therefore an *ethical* requirement – a *professional* requirement – for psychologists and teachers to try to do something about it[14]. What competencies do they need to do *that?* We will return to this question.

Here we should note something else … something to do with *incompetence* and the demand for certificates supposedly testifying to professional competence.

The information summarised above shows that evidence of the gross incompetence of one of the most widely dispersed "professional" groups – teachers – in the world is available through direct personal experience to at least one third of the population. No wonder they demand that politicians find some way of doing something about the situation. Surveys reported by Schön (1983, 2001) and Ilott (2001) show that vast numbers of people either have direct experience of, or are acutely aware of, instances of professional incompetence among doctors, lawyers, nurses, social workers and others. This experience includes the widespread observation that many "professionals" find ways of meeting "targets" that have been laid down for them or creating the impression of following mandatory procedures *without* delivering the benefits they are expected to deliver to clients (Seddon, 2008). Hogan (1990) shows that not only do some 70% of the population have direct experience of working with an incompetent boss or manager, 50% of American managers *are* grossly incompetent, destroying the confidence of their subordinates, undermining their colleagues, and driving their organisations into the ground for the sake of personal gain. We (Raven & Dolphin, 1978) were shocked to find that many of the senior civil servants we interviewed were not the least bit concerned about whether the divisions for which they were responsible delivered the benefits they were charged to provide. Instead they were concerned only to grow their empires. Our observations are confirmed by research reported by Hope (1984), Day & Klein (1987), and others.

And here is the catch. The response of politicians and most professional organisations to such observations on the part of the public has been to introduce "quality control" procedures based on *assessments of technico-rational knowledge.* Hence the proliferation of demands for certificates of "competence" to carry out the most menial tasks and the proscription of actions which go beyond what these areas. Hence the endless regulations about of which Schön's professionals complained so loudly. [The way in which concerns with incompetence stemming from failure to exercise high level competencies gets translated into prescriptions for low level skills to be mastered and demonstrated has been discussed by Ilott & Murphy (1999) and Raven (2001a.)]

Yet, as the work of Schön, Hogan (1990), Becher (2001), Ilott (2001), and others has shown, incompetence is not the obverse of competence. The main sources of *in*competence do not arise

from deficits in the technico-rational domain. Nor do they even arise mainly from deficits in the kinds of competencies we have highlighted above. Rather, they arise from failure to *exercise* those competencies. They stem from a lack of *professionalism.*

The point can be illustrated using a quotation from Becher (2001): "The anaesthetist (who sought to blow the whistle on an incompetent surgeon) was sacked; the surgeon was allowed go to on killing people". Since no further development of the surgeon's technico-rational competence would have done much good, one has, perhaps, to conclude that it was the *anaesthetist'*s competence that was deficient. How are people to get something done about important barriers to the effective delivery of services by colleagues or the organisation they work for – in this case, the incompetence of a colleague? But even this conclusion is inadequate – because what the example really illustrates is that both competence and incompetence are *group* characteristics and that, as Kanter (1985; but see also Cunningham, 2001) in particular has observed, it is in people's contributions to these group activities that their competence primarily inheres. Yet the ability to contribute to group activities is largely invisible in the current scheme of things and does not usually come to mind when some kind of development activity is envisaged.

It is important to generalise this observation: Our competence *as psychologists* depends overwhelmingly on the (currently invisible) things we do to contribute to collective activity, and, in particular, what we do, through our professional institutions, to influence the research which gets carried out and the context in which we work.

The Importance of Beliefs about Society

Before leaving the question of competence and incompetence, and especially professional competence, we need to return to another quality which pupils, teachers, parents, and employers said was very important for pupils to develop, namely the ability to build up one's own understanding of how society works and, especially, the ability to improve its operation.

With a view to checking the validity of the claims made by those we had interviewed about educational objectives, I interviewed a cross section of workers, ranging from street sweepers and blacksmiths to the chief executives of trans-national corporations (Raven & Dolphin, 1978). I opened the interviews by asking my informants to tell me something about their jobs and their lives. Before long, they would be sitting on the edge of their chairs telling me about some problem they had. I would then ask "What could you do about that?" One after another they said "There's nothing I could do about it: the government should do it – but it's not my job to influence the government". Somewhat taken aback, I proceeded to arrange for our participation in a couple of national surveys around the topic (Raven & Whelan, 1976; Raven & Litton, 1982). These confirmed my initial observations: By and large people felt that only the government should tackle their problems. I was shocked. But then an interesting thing happened. An economist colleague pointed out that, in all countries of the EU, some 45% of GNP is spent directly by their central governments. But this is not the end of the story: the figure does not include expenditures by local governments or the nationalised or quasi-nationalised industries. When these are added in, the total comes to some 65%. And even this is not all. By requiring people to insure their cars, their health, meet endless regulations regarding health and safety and so on, governments "control" much more of total expenditure. We calculated 75%. Wow. The people were right (again!). So the importance of being able to build up one's own understanding of how society works … which involves much more than understanding the formal political system … turns out to be even more important than most people think. Indeed, it turns out that people's beliefs about society, how it works, and their place in it are,

despite their neglect by psychologists, some of the most important determinants of behaviour. But there are good reasons why teachers and psychologists shy away from the area. Encouraging people to analyse and think about these processes and develop the strategies required to intervene in them is, as Harold Rugg (Rugg, 1926; Robinson, 1983) and others (e.g. those running the UK Schools Council Humanities and Integrated Science Projects) discovered to their cost, not only controversial but dangerous – much more dangerous than communicating the formulations of Karl Marx or Adam Smith. Yet it cannot be too strongly emphasised that the ability to understand and influence social forces and invent ways of handling the value conflicts involved is a crucial competence to be possessed by – one would like to say "all", but that is not the case – citizens – especially those responsible for education and for bringing innovative programmes of psychological research and new forms of public management into being.

The Contrary View

Most psychologists would take issue with much of what I have said about the importance of high-level generic competencies in the workplace, citing numerous impressive studies which appear to show exactly the opposite. These include those brought together by such authors as Gottfredson (1997), Schmidt and Hunter (1998), Jensen (1998), and Ree, Earles, and Teachout (1994). Such studies seem to point unarguably to the conclusion that, as Ree et al. put it, *"g and not much else"* is important.

The discrepancy between the conclusions emanating from these two streams of research stems from what seems, on the surface, to be a difference in methodology. However, it, in reality, reflects a basic difference in the thoughtways (paradigms) on which the studies are built. Although this was highlighted by none other than the father of *g,* Charles Spearman, almost a century ago, the accepted criteria for high quality measurement taught in most advanced courses, and demanded by most journal editors, almost preclude the development of a more appropriate paradigm.

Spearman wrote:

> "Every normal man, woman, and child is … a genius at something … It remains to discover at what … This must be a most difficult matter, owing to the very fact that it occurs in only a minute proportion of all possible abilities. It certainly cannot be detected by any of the testing procedures at present in current usage."

What he means to say, although he didn't fully realise it, is that it requires the development and adoption of an alternative way of thinking about and "assessing" individual differences. Or, more bluntly, that the current paradigm renders most people's most important talents invisible. It therefore deprives them of opportunities to get recognition for and utilise them. In reality, a more extreme statement turns out to be justified: it denigrates them.

The implications of these observations (and this will become a recurring theme of this chapter) are twofold. On the one hand, they urge us to resist offering, or participating in, "professional development" activities which will lead to further embedment of inappropriate thoughtways and procedures. On the other hand, they underscore the notion that we have a professional responsibility to contribute to the development of a more appropriate framework. It is to the development of the understandings and competencies required to do this that activities concerned with the professional development of psychologists need most importantly to be directed.

But hand in hand with the task of developing a more appropriate psychometric paradigm comes the task of clarifying the *nature* of these competencies; developing better ways of thinking about them.

Building on the work of McClelland et. al., (1958), I have argued (Raven, 1984/97, 2001f, g) that a two *component* framework is required to think about competence and ability. First we need to know what it is that the person is strongly motivated to do. And then, *and only then,* we need to find out which components of competence, such as thinking about the nature of the task being undertaken, bringing to bear relevant acquired habits and information, creativity, and persuading other people to help, the individual being assessed brings to bear in his or her efforts to undertake the activity.

It does not make sense to seek, as most psychometricians do, to assess "initiative", "creativity", or even "the ability to think" (problem identification and solving ability; meaning-making ability) generically – independently of the activity being undertaken. These are all complex, difficult and demanding, activities that no one will undertake unless they are strongly and intrinsically motivated to carry out the activity. "Thinking", for example, involves such things as waking up at night wondering what it is on the fringe of consciousness that is bothering one, bringing it to the centre of attention, and clarifying its implications. Perhaps more importantly, it involves unverbalised, feeling-based, "experimental interactions with the environment" and monitoring the results for what they have to tell one about the nature of the problem and the effectiveness of one's strategies. (To quote Spearman again: "The question is not 'How well can someone think?' but 'What does he tend to think about?'")

To anticipate our later discussion, the above observations imply a two-*stage* (*not* a 2-factor) assessment procedure. It is necessary to first find out what the person being assessed is strongly and intrinsically motivated to do, and then, and only then, which of these components of competence he or she tends to bring to bear to carry out the task (he or she will not display these components of competence unless engaged in a task they care about). In other words, what this means is that we need a *descriptive* model analogous to those used in chemistry and biology to think about competence and its assessment. This may be contrasted with the *variable*-based models so common in physics.

The problem with most of the studies of workplace competence reviewed by myself (Raven, 1984/97) and Spencer and Spencer (1993) as well as those being developed by psychologists involved in the "strengths" based movement (e.g. Buckingham & Clifton, 2005) is that their authors adopt idiosyncratic frameworks to describe the competencies needed in the occupational group or organisation studied. If we are to move forward it will be necessary to develop a common, agreed, set of descriptors – as in chemistry and biology.

I developed a preliminary version of such a model in my 1984 book *Competence in Modern Society,* where I refer to it as an "atomic theory of competence". Two key (if preliminary) observations were that the kinds of things people might be strongly motivated to do (i.e. activities they could be said to value) – ranging from developing better scientific theories through putting people at ease to creating political turbulence – seemed to be endless, while the components of competence that might be brought to bear to carry out those activities seemed more limited in number.

According to Lyle Spencer (personal communication) Spencer and Spencer (1993) set out to formalise and elaborate such a model in their quest to find ways of systemising and summarising

the results of the hundreds of critical-incident based studies of workplace competence that had been conducted by that time. But an interesting thing happened. The publishers' reviewers argued that such a framework would differ so much from what readers expected that few would purchase the book. In that case, said the publisher, we won't publish it. And so it came about that the Spencers were led to try to merge the competency studies they were reviewing into something approaching a variable-based framework. Although this was more than a little unfortunate, *Competence at Work* remains the best book available on the subject.

In concluding this section I would like to reiterate the basic points being made here. On the one hand, attempts to introduce such things as licensing arrangements requiring people to demonstrate familiarity with traditional procedures is to be resisted. On the other hand, any claim to professionalism by those working in the area needs to be supported by evidence of a commitment to advance the development of psychological theory and practice in the area.

Nurturing Competence: The Importance of Developmental Environments

Over the past half century we have studied the development of competence in homes, schools, and workplaces. I will summarise some of the results in a moment. But first I should comment on the way in which psychologists have generally sought to investigate the effects of the environment on human characteristics.

Quite apart from the widespread gross mis-use of multiple regression techniques in research studies (APA, 1999), most of those working in the area have sought to determine the relative importance of a variety of environmental variables by running correlations between scores on ability "variables" and environmental "variables". But ask yourself where biologists or chemists would have got to if they had tried to classify all animals or substances in terms of 1, 2, 5 or 16 variables (analogous to *g*, "fluid" and "crystallised" "intelligence", "Big 5", or 16 "personality" factors) and then tried to establish the part played by different aspects of the environment in generating this variance by calculating the correlations with 10 variables purporting to measure the environment.

The outcome doesn't bear thinking about! But it is worth noting that, had they proceeded in this way, they would have been entirely unable to account for some of the simplest things – such as the transformations that occur in e.g. chemistry (as one pours sulphuric acid onto copper, for example) or the development of complex ecological niches as in symbiosis. While reflecting on the implications of this, note that the properties of copper sulphate cannot be predicted by combining the individual properties of copper, sulphur, and oxygen in any kind of linear way, and those three substances are not recognisably "the same" when studied in combination and when considered individually. Psychologists who have sought monotonic relationships (in which a change in one variable is expected to produce some incremental change in another) between individual and environmental "variables" are unable to account for (or, indeed, even recognise) such things as the transformations that occur in homes, schools, and workplaces as mentors' values engage with those of tutees and, through the release and modelling of components of competence, produce dramatic changes. (Winter, et al, 1981; Jackson, 1986).

Although it is not entirely apposite here, it may be useful to comment on the widespread misinterpretation of heritability estimates. Consider this: If one takes the seeds of a variety of strains of wheat into a different environment, their heights, yields, fertility etc. all change – *but they do not even remain in the same rank order*. The strains that produce the highest yields in one environment are not those that do so in another. And the correlations between heights, yields, and fertility all

change. So the change in the environment has had a *dramatic* effect. Nothing is as it was. But this would not show up in the kind of heritability estimates calculated by psychologists because the differences between the strains are still genetically determined**.** As Messick (1989, 1995) put it "high heritability does not imply low mutability". Yet the assumption that high heritability does preclude mutability pervades most discussion of these issues in psychology.

Developing Competence in Schools

As has been mentioned, extensive studies[15] have shown that few of the activities that characterise most schools are likely to lead to the development of high-level competencies.

However, there are exceptions. In the course of our own research (which was carried out in both elementary and secondary schools) we observed that, as described below, when teachers set out to nurture high-level competencies through inter-disciplinary, enquiry-oriented, group-based, project work largely conducted in the environment around the school, huge numbers of talents, at best only marginally related to *g,* come to light.

This is hugely important for at least two reasons. First, these talents are invisible, unrecognised, neglected, and, indeed, stifled, if one accepts the framework for thinking about individual differences adopted by most psychologists – including those providing courses purporting to enhance professional competence in the area. Second, the work illustrates one way in which these diverse talents can be nurtured, released, and harnessed to create climates or cultures of enterprise or intelligence. From this follows a dramatic reorganisation of most peoples' thoughtways. "Intelligence" is to be understood as an *emergent property of a group* rather than an individual characteristic. Furthermore, this intelligence depends on releasing and harnessing a huge variety of individual talents that are scarcely related to intelligence as conventionally understood. Thus, conventional ways of thinking are unethical – destructive of both individuals and society.

We proceed now to our example. But, by way of introduction, we have to ask readers not to think they have heard it all before in relation to project work conducted under the rubric of "progressive education". Most such project work is concerned with a different method of attaining the conventional goals of "education". In the work to be summarised below the *goals* are different.

When we first visited one of the elementary schools we studied (Raven, Johnstone, & Varley, 1985), we found the pupils engaged in a project designed to get something done about pollution in the local river. The project, its organisation, its effects, and the problems it posed for evaluation all merit detailed discussion, but only the briefest account can be given here. Some pupils decided that the first thing to do was to measure the pollution in the river. Some of them then set about collecting samples of the river water and trying to analyse it. This took them to the not-so-local university where they worked with lecturers trying to engage with this – apparently difficult – problem. Note that these pupils were developing the *competencies* of the scientist: The ability to identify problems, the ability to invent ways of investigating them, the ability to obtain help, the ability to familiarise themselves with a new field, and the ability to find ways of summarising information. Other pupils decided that more progress was to be made by studying the dead fish and plants along the river bank. Still others argued that all this was beside the point: The river was clearly polluted: the problem was to get something done about it. Some then set about drawing pictures of dead fish and plants from the river bank with a view to releasing community action. The objective was not to depict what was seen *accurately,* but to represent it in such a way as to evoke emotions that would lead to action. While the "scientists" mentioned above sought to report the results of their work in

what might be termed a classic academic format, other pupils again argued that that was irrelevant and set about generating slogans, prose, and poetry that would evoke emotions that would lead to outrage and action. Thus the *criteria* for what constituted effective reading and writing differed markedly from those which dominate most classrooms and they varied from pupil to pupil. Still other pupils argued that, if anything was to be done about the river, it was necessary to get the environmental standards officer to do his job. (It turned out that he knew all about the pollution but had done nothing about it.) This led some pupils to set up domino-like chains to influence politicians and public servants. This in turn led the factory that was causing the problem to get at the pupils' parents saying that, unless this teacher and her class was stopped, they would all lose their jobs. Unabashed, some pupils set about examining the economic basis for the factory's claims.

Note that this teacher was not so much concerned with enhancing pupils' specialist *knowledge* in each of these areas[16] as to nurture a wide range of *different **competencies*** in her pupils. These competencies were not limited to substantive areas of investigation but also included the ability to contribute to group processes, including such things as the ability to put people at ease, the ability to de-fuse the intolerance which develops between people who contribute in very different ways to a group process (e.g., the intolerance of "artists" for "scientists"), the ability to publicise the observations of the quiet "ideas person", and the ability to "sell" the benefits of the unusual educational process to parents[*]. The teacher in fact devoted considerable attention to highlighting the different types of contribution which different children were making to the group process. As a result, they stopped thinking of each other in terms of "smart vs. dumb" and instead noted what each was good at.

It is important to repeat that what was happening here required those involved to make *descriptive statements* about each individual pupil's talents and areas of knowledge and expertise. Despite the assumptions which many of those who have grown up in the current climate of assessment bring with them, this could not be achieved by trying to arrange them on scales 'measuring' these different abilities because a *different set of scales* would be required to record the talents of each child. To help readers get the point, it might be useful for them to try to imagine trying to describe chemical substances in terms of profiles of ratings across each of the 96 elements. Huge amounts of useless information would be generated and the process would still fail to reveal the emergent properties which arise when different elements combine. It is what people are good at, and their idiosyncratic expert knowledge (mostly non-verbalised and consisting of knowing-how rather than knowing-that) that we need to record if we wish to evaluate them.

Note, also, that the class's ability to achieve its objective was dependent on *an emergent culture of intelligence or enterprise* which involved harnessing the *diverse* contributions of the pupils and *not* on individual champions or "high ability" pupils. More than that, many of the competencies individual pupils could develop and display were entirely dependent on other pupils creating an appropriate "environment" made up of 'supporting' activities. Such competencies could only be said to *exist* in such a context.

At this point, attention must be drawn to the fact that the work just described, while superficially similar to the work reported in the hundreds of accounts of project-based education that are to be found in the "progressive education" literature (reviewed in Raven, 1994) differs from most of it in that the teachers' and pupils' notion of *what was to be learnt* was different. Pupils were to learn to lead, to invent, to put people at ease, to create political turbulence, etc. The objective was not that they should "learn" in the sense of acquiring stocks of standard, formal, low-level, verbal

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[*] Note the similarities between this list and the list of diverse contributions which Kanter (1985) and others have noted in groups concerned with innovation in workplaces.

knowledge. The ability to build up idiosyncratic combinations of up-to-date specialist knowledge – yes – but that was different. The dozens of projects of this sort studied by Grannis (1983) and ourselves thus went far beyond those described in the widely publicised work of Gardner and his colleagues (Gardner, 1987; Hatch & Gardner, 1990; Krechevsky & Gardner, 1990). The teachers we are talking about here were not dealing with six or seven "intelligences" or areas of skilled performance but with the ability to carry out one or another of a huge range of necessary, and mutually supportive, activities. It is true that all of these demand and reveal some form of "intelligence". But they also demand a wide range of additional components of competence – the ability to learn from the effects of one's actions and modify one's behaviour accordingly, the ability to persist, the ability to get help, and so on. It is also vitally important to note that none of these components of competence can be meaningfully developed or assessed generically – across all kinds of potentially valued activity – but only in the context of the specific activity being undertaken. Thus one person will display a great deal of creativity while bringing about classroom disruption, another while putting people at ease, and another while finding ways to undertake a scientific study. And none of them can be meaningfully assessed by asking those concerned to construct something "creative" out of a collection of toy bricks.

To reiterate the point for emphasis: what we have here is a demonstration of not merely the feasibility but actual importance of moving from thinking in terms of "ability" to abilit*ies*, of moving from viewing education as primarily concerned with conveying *content* to seeing it as being mainly concerned with nurturing *competence*, and from thinking of "intelligence" as a relatively unalterable, individual quality to something which is a distinctly alterable characteristic of a group. It also requires us to think of the processes involved in a way analogous to those that would be required to think about the development of different species within an ecological niche and the characterisation of the niche as a whole.

It cannot be too strongly emphasised that the hijacking of the term "learning" to mean learning *content* has to be strenuously resisted. One has *always* to ask learning (*to do*) **what?**

A similar ploy can be used to challenge widely accepted thoughtways about abilities. There is a tendency to seek to, for example, arrange people in a hierarchy according to their "creativity". But it is clear that one of the pupils mentioned above displayed a great deal of creativity in the course of orchestrating classroom (and political) disruption, another while putting others at ease, and another while finding ways to undertake a scientific study. One has always to ask: "Creativity (etc.) *in relation to carrying out which kinds of activity*?"

Developing Competence in Homes

Much of the material in this section comes from our evaluation of a pre-school educational home visiting scheme (Raven, 1980). This was designed to "emphasise the unique and irreplaceable role of the mother in promoting the educational development of her children". Educational Home Visitors, who were all trained teachers, visited the homes of 2-3-year-old children for about one hour per week over some nine months and, by working with the children in the first instance, set out to encourage the mothers in activities which were believed to promote children's development, particularly cognitive development.

To evaluate the scheme it was necessary to clarify what the mothers' role in promoting children's development really involves. At the time, there was plenty of evidence that something about the home influenced school success (e.g. Coleman, 1966; Plowden, 1966; Walker, 1976) and especially that reading to children was important (see Raven, 1981, for a review). Hess and Shipman (1965)

had drawn attention to a connection between discipline strategies and cognitive and moral development.

 However, Kohn (1969) had noted that parents varied markedly from one to another in the qualities they wanted their children to develop.

Our work, together with that of Kohn (1969, 1977), Sigel (1985, 1986), Sigel and McGillicuddly (1984) and McGillicuddy-De Lisi (1982), showed that parents explicitly adopted particular child rearing practices with a view to fostering the qualities they valued in their children. Sigel, Kohn et al. (1986), MacKinnon (1962), McClelland (1958, 1961, 1982), and Bloom (1985) showed that parents' beliefs about the causal connections between child rearing practices and the qualities their children develop were basically correct.

The results of our research may be indicated by discussing two groups of parents. Parents in the first group want their children to do as they are told and master school tasks that are put in front of them. They want them to value toughness and strength, dependence rather than independence, and group solidarity more than personal advancement. Parents in second group want their children to develop independence, the confidence and the ability to ask questions, creativity, initiative, and the confidence and the ability required to talk to adults.

The competencies valued by both these – and other – groups of parents appear to be crucial to the effective operation of society (Raven, 1977, 1984). Nevertheless, I will here use the term **developmental environment** to refer to a kind of environment more likely to be created by parents in the second group. These parents try to identify the particular interests and talents of each of their children and then create situations in which their children can undertake activities they care about and, in the process, exercise and develop competencies like those mentioned above and others – like the ability to invent, plan, persuade, find ways of reaching their goals, and monitor their own behaviour. These parents are much less likely than those in the first group to try to prescribe what their children will think, feel, and do.

Having set up a situation in which children can practice observing, inventing, adventuring, communicating, experimenting, and thinking whilst undertaking activities they care about, parents who create effective developmental environments intervene only occasionally. They do this sensitively when they sense an opportunity to assist their children through what Vygotsky (1978, 1981) might have termed a zone of proximal development. They help their children to conceptualise, to notice and resolve discrepancies between the expected results of their actions and the actual results, and to think about things which are not immediately present. They encourage them to think about the future and the long-term personal and social consequences of their actions and to act on those insights. They share their values and their view of the world with their children. They let them know that they think it is *important* to think, invent, adventure, and be in charge of one's destiny. They lead their children to become sensitive to cues which tell them that things are not working out as they had hoped, or even that they are getting out of control and that they should therefore either stop or get help. In this way their children learn to adventure into the unknown, secure in the knowledge that they can detect when things are going wrong and that they will be able to re-gain control.

However, many parents do not engage in the behaviours just described, not because "they do not know that it is important" to do these things, but because they do not *want* their children to develop qualities like adventurousness, independence, and creativity – or even curiosity or an interest in books. Many of these parents facilitate their children's growth through *alternative* "zones of

proximal development". They lead their children to develop *different* concerns and competencies. These parents sometimes encourage their children to be sensitive to cues which indicate the need to offer emotional or economic support to relatives and friends. They sometimes foster the disposition to invent ways of putting others at ease. They sometimes teach their children how to present themselves as tough, strong, and "macho". They sometimes foster the ability to stick up for oneself and resolve one's own disputes – by, for example, refraining from intervening in disputes and tolerating considerable fighting, but then, if things do get out of hand, punishing all the children equally instead of apportioning blame.

But we also met parents who *would* have liked to foster in their children some of the more "middle class" qualities mentioned, but still did not do so. There were several reasons for this. One was that they suffered from value conflicts: Yes, they would have liked their children to be independent, but that might result in them becoming geographically mobile and neglecting them in their old age; Yes, they would have liked their children to be "bright" – but that might result in their putting on airs, getting above themselves, disowning their parents, and asking them questions which they could not answer. Other parents were prevented from fostering qualities which they valued in their children by environmental constraints: Yes, they would have liked their children to be adventurous – but being adventurous in the environments in which they lived was dangerous, and anyway they did not know how to lead their children to develop the dispositions – personal monitoring behaviours – which would enable them to adventure in safety. Yes, they would have liked to spend more time with their children, but they had to devote all their available time and energy to keeping body and soul together, to defending themselves and their children against attacks from their husbands, or to getting the electricity turned back on again. Yet others would have liked to treat their children in more developmental ways, but they were isolated, tense and lonely, devoid of advice and support, and short of anyone with whom they could discuss problems (See Burns et al. [1984] and Raven [1987] for a fuller discussion of these processes.)

Parents, Language, and Cognitive Development

Although somewhat out of place in a chapter mainly concerned with the wider aspects of competence, the abilities required to read, write and communicate do constitute areas of competence rather than areas of codified knowledge. Furthermore, the research summarised below is of considerable interest from the point of view of illustrating some of the problems involved in substituting "professional" for "amateur" activity in areas of central concern to psychology[17].

One of the things which emerges from this research[18] is that many parents promote language development by engaging with their children in joint endeavours in the course of which they extend their children's utterances. While taking the conversation forward, they rephrase some of the things their children say. They incorporate some of their children's own words but also substitute new words of appropriate difficulty so as to express the same ideas more succinctly. At the same time they improve the grammatical structure. If their children show that they do not understand what is said, they decrease its complexity. They *elicit* language from their children by watching what they are doing and listening carefully to what they are attempting to say and then creating opportunities for them to articulate and think about issues which they can barely understand and which they are having difficulty expressing.

As far as cognitive development is concerned, many parents encourage their children to make their own observations and discoveries, to think and to abstract, by talking about what has happened in the past and what might happen in the future, to study the causal processes connecting one event to

another, and how a desired future is to be achieved. In this way, children are encouraged to think about the consequences of their thoughts and actions, resolve discrepancies between anticipated and actual consequences, and bring plans to fruition. But cognitive development is also promoted *indirectly*: Parents share their feelings of delight, anticipated delight, and frustration (in both their own and their children's actions) with their children. By encouraging adventurousness, independence, and confidence in dealing with adults they lead their children to make their own observations, educe concepts, study relationships, and experience the benefits of taking thought. If they set out to *earn* (as distinct from command) their children's respect they have to reason with them children and discuss long-term, abstract, social processes (which involve intangible variables) in order to persuade their children of the desirability of any particular course of action.

School vs. Home "Education"
(or "Professionals" vs. "Amateurs"?)

One of my aims in this chapter is to call into question most conventional notions of what is meant by professionalism and professional development and, in particular, to underline the need to define professionalism as involving contributions *outside* one's domain of specialist technico-rational knowledge and, especially, contributing to the development of professional understanding.

Thus far, I have reviewed material which suggests: (i) that education involves a great deal more than schooling; (ii) that parents are their children's most important educators, not in the sense that they "school" their children, but in the sense that they deploy sensitive strategies to facilitate the development of a wide range of important motivational dispositions and components of competence (including the ability to perceive, think, read, and communicate); and (iii) that parents promote school success and cognitive development, not by doing the things which schools do, but *indirectly*, by fostering such qualities as the ability to think for oneself and confidence in dealing with adults.

By way of contrast, most of the time which most children spend in schools is devoted to repetitive, non-cumulative, activities which rarely involve judging, communicating, planning, or analysing. Whereas parents tend to engage their children in conversations which involve thinking about and planning the future, recalling the past, and clarifying what they are good at, Tizard et al. (1984), Sigel (1986), and others have shown that there is usually very little communication between teachers and pupils in nursery schools. Such teacher-pupil interaction as does occur tends to consist of teachers asking a series of fast-paced questions which are not contingent on pupils' previous utterances or behaviour – let alone on their unverbalised thoughts. Parents and their children use language for many purposes – to problematise, to persuade, to think about social processes, to think about the child's and the parent's interests and feelings, to study other people's interests, feelings, thoughts, personalities, talents and reactions. All of this is typically missing from schools.

When one turns to one area of competence development in which teachers do claim particular professional competence, namely nurturing the ability to read, it again emerges (Tizard, J., et al., 1982) that many parents are more effective than most teachers. One reason is that, as Francis (1982) found, parents tend to embed reading with their children in a meaningful, on-going, joint, activity. They provide different kinds of assistance depending on the child's previous experience with particular words. They vary what they do with the child's expectation of the text and with the child's (and their own) beliefs about the purpose of the reading session. When they help children to clarify meanings, they take account of the particular context in which the word is used and its function in the sentence. They relate the material they read to the child's interests. They spend a lot of time thinking about children's specific difficulties and trying to invent ways of helping them to

overcome them. In contrast, infant school teachers tend not only to teach reading through a "single best method" (instead of varying that method from child to child), they actually decline to adjust the method they use to take account of common problems. As I have shown elsewhere (Raven 1989), if one pursues the matter, the contrast continues, by and large to the distinct advantage of the non-professional group.

When it comes to writing, one again finds that, whereas teachers tend to focus on low-level components of the task – such as on the *form* of letters and the format of sentences – parents tend to encourage their children to write about things they care about, and, in so doing, lead their children discover the deeper structure of language. They also develop idiosyncratic ways of communicating effectively by using such devices as allusion and innuendo. Many parents encourage their children to write messages with a view to influencing other people. Their success or otherwise in this endeavour provides the children with feedback about the effectiveness of their strategies. In contrast, in most schools, language activities are restricted to filling in blanks in sentences or, at best, writing, very briefly, about things which are of little interest and without the benefit of feedback from seeing the effects of the action (HMI, 1980; Raven, Johnstone, & Varley, 1985).

When one turns to the development of the ability to perceive and think clearly one finds that schools, at least in comparison with parents, confer still fewer developmental benefits than they do in the areas we have so far reviewed[19].

One conclusion to this section must, therefore, be that, while parents lay down in young children a number of vitally important motivational dispositions and foster crucial competencies – including the ability to read, think, and communicate – the widely held view that professional educators … which is what teachers are assumed to be … can do these things anything like as well as parents is without foundation.

It is often claimed that the main reason most teachers don't do them has to do with class sizes. But this is actually not among the main causes of the discrepancy. Dewey had one adult to every four pupils in his school, but still only about 5% did what he enjoined them to do (Fraley 1981). In the Home Visiting project discussed earlier, there was one teacher to every child and their task was to model mothering behaviour! *Still* most of them did not do the things many mothers do "instinctively". Part of the problem was that they felt obliged to conform to their image of what a *teacher* does. But other reasons included the fact that they did not know what the children's interests were and felt that they did not have the time to sit around and wait for this to emerge. After all, they were paid to be there to make something happen. Because they did not know what the children's motives were, they had little opportunity to harness them to create opportunities to feed the growth of important components of competence like seeking out and acting on self-generated feedback in order to undertake an activity more effectively. They had few opportunities to engage the child in activities that were important to them (the teachers) and then both model competent behaviour for the child and engage the child in thinking about constraints and inventing ways forward. Besides, their priorities in child development often conflicted with those of the mother. The mother might not want the child to ask questions or even to find written material which would enable them to pursue their own interests "Goodness knows what he might find poking about in books".

Note that it was not that they did not *know* how to do these things: Most of them were, after all, mothers. As one of them put it on reading a transcript of one of her visits "I was horrified by that: there I was being a *teacher* and doing all sorts of things that I would not have done as a mother!"

One of the things we have here is evidence of psychologists' general neglect of external determinants of behaviour. If we are to claim competence *as psychologists* we have to pay much more attention to these. If we are to claim to be *professional* psychologists, we have to join together with others to get something done about the pervasive neglect of such factors in the conceptual and research base which guides our profession.

Another important observation to be drawn out of the material we have reviewed is that, by and large, psychologists have not challenged widely circulated myths about the importance of early childhood "education" in schools. On the contrary, they have trotted out "evidence" which appears to support these myths and sought to "contribute" to activities guided by them. Few have suggested that a *professional* response to the evidence summarised here would be suggest that schooling (at least at these ages) is unprofessional, even unethical, and that alternative strategies need to be found to facilitate parents' "amateur" activities in these areas. These might involve such things as ("non professional") mothers' groups to facilitate the development of high-level competencies in each other. Few have argued that one of the main functions of the myths mentioned above may be to facilitate and legitimise the recruitment of mothers into the workforce. Still fewer, in fact none so far as I know, have asserted – as I will assert here – that one of the functions of the work they are to be released to do is to contribute to the network of processes that are so effectively destroying our habitat and thus heading our species toward extinction at an exponentially accelerating rate carrying the planet as we know it with us.

Less controversially, it is clear that, by and large, psychologists have not sought to provide parents (or teachers) with an agreed framework for thinking about multiple talents and how they are to be nurtured. They have not provided either group with tools which would help them to think about, identify, and nurture such diverse competencies. Once again, there are endless opportunities for psychologists to contribute to the development of new thinking and procedures in the area.

But psychologists' claim to competence in the area is called into question by such sins of omission as their previously mentioned failure to problematise the word "learning" and take steps to ensure that it is always used in connection with a qualifier: learning *what?*: learning to lead, to invent, to put people at ease, to engage in industrial espionage? Another would be their failure to draw attention to the huge variety of priorities in education (never mind the legitimacy of many of these diverse perspectives) or suggest ways in which incompatible priorities might be catered for

As far as professional development is concerned, it is clear that one thing we do *not* need is a requirement that teachers and psychologists demonstrate that they have undertaken activities (such as reading or going on courses) to bring them up to date with "developments" within the dominant paradigm of schooling and education. Equally, it is clear that one of the things we do need is opportunities for teachers and psychologists to contribute to the development of new ways of thinking, new tools, and new social arrangements. Backing up one step, what this would seem to mean is that it is necessary, if teachers and psychologists wish to claim to be professionals, for them to be involved in *promoting* such developments.

Developing Competence in Higher and Further Education

It is often claimed that the study of many subjects, including literature and science, promotes the development of qualities like the ability to problematise, analyse, engage in critical thinking, and understand how things work (see Dockrell, 2001). Yet this claim has rarely been tested and the

proliferation of taught courses, now often delivered by the internet and evaluated by multiple-choice tests, leads one to doubt it.

There can, however, be little doubt that Higher and Further education *should* be primarily concerned with the development of generic, transferable, high-level competencies. Indeed, unless it does so, it is difficult to justify current arrangements because only a minority of students pursue careers related to their discipline of study. For example, in 1990, over 40% of graduates in history from British universities and nearly 40% of graduates in physics went into marketing, management services, or financial work. Graduates from physics, the biological sciences, and foreign languages enter almost as wide a range of jobs as do graduates from English, history, and the social sciences. (Association of Graduate Careers Advisory Services, 1992). The vast majority claim that they have ceased to use any of the specialist knowledge they so painfully acquired at college after two years at work.

In some sense, the situation in the US is worse. The majority of college graduates end up as cashiers, janitors and cleaners, sales person, shelf-fillers, maids, nurses, home health aides, and guards. As of 1995, 1.3 million college graduates were employed as blue-collar workers … and the number was steadily increasing (Steiner, 1999). What one sees is the inflation of entry requirements in order to limit the number of seemingly qualified prospective entrants. There is scant evidence that the levels of techno-rational knowledge required to function effectively at various levels in the occupational hierarchy has increased.

Among the studies which *have* examined the wider effects of higher education are those conducted by Jacob (1956), McClelland and his colleagues (e.g. Winter et al., 1981), Murphy (1993), Steiner (1999) and Mentkowski (2000). [Unfortunately, the vast majority of studies of Higher Education, such as those brought together by Pascarella & Terenzini (eds.) (1991), fail to examine such issues.]

The overall conclusion from these studies is that most higher education confers little of value so far as the development of generic competencies is concerned. But it is important to draw attention to two major problems which arises in the conduct of this research. While, as Roizen and Jepson (1985) showed, "everyone knows" there are major differences between students emerging from different institutions, these, as Jencks et al. (1973) had earlier shown in relation to school education, largely reflect differences between the entering students. Partialling out the effects of that variance whilst examining the effects of the educational process is problematic in itself. But much more problematic are, firstly, the dearth of measures of relevant outcomes and, second, the problems involved in tailoring the measures employed to the nature of the specific programmes being evaluated[20].

When these problems have been overcome, it emerges that some institutions *do* succeed in nurturing important high-level competencies. Paradoxically, one the major groups of institutions that do so comprises those institutions those that are most widely accused of "elitism"– namely "Ivy League" colleges in the US and their equivalents in Britain[21]. The other main group consists of colleges with a special mission, such as Bennington and Alverno.

Once again, it has emerged that certain forms of joint project-based education are particularly important. Also – and, for the sake of brevity, I did not dwell on it in connection with school education – exposure to mentors who share the students' concerns and provide role models (especially of the normally private components of competence which make for effective behaviour). We will encounter this again when we review what effective managers do to promote the

development of competence in their subordinates. By engaging students in their own research, mentors not only portrayed high-level competencies in such a way that the students could "catch" them but involved the students, as apprentices, in those very activities. Thus students became involved in puzzling over half-identified and barely verbalised problems, undertaking "experimental interactions with the environment" to clarify both the nature of the problem and the effectiveness of strategies being employed. For example, a tutor might say (but not in so many words) "We seem to have a problem here. I'm not sure what it is. But if we do *this* ……. Whoops, NO!; that was a mistake. But what that means is … ". And so on. In such ways students came to develop the confidence and competence needed to adventure into the unknown. More than that, they came to think it was *important* to do so. Also important were demanding, Socratic-like, interactions which challenged the way students thought and led them to change those thoughtways and assumptions, to engage in critical thinking, and enhanced their ability to muster arguments and persuade.

Once again, as in the contrast between parenting and schooling, it is clear that these are personal interactions which cannot easily be incorporated into large-scale programmes.

Despite this, one institution, the School of Independent Studies at what was then the North East London Polytechnic (NELP) (see Stephenson, 2001), did at least illustrate how this could be done … although the project was in due course eliminated through the "quality control" procedures mentioned earlier.

The concept of capability which underlay the programme had its origins in a *Capability Manifesto* drawn up by the Royal Society for Arts in 1980. This viewed capability as an all-round quality, observable in what Weaver (1994) described as the ability to engage appropriately and sensitively in "purposive and sensible" action, not just in familiar and highly focused specialist contexts but also in response to new and changing circumstances. This was seen to involve ethics, judgements, the self-confidence to take risks, and a commitment to learn from the experience. A capable person has culture, in the sense of being able to "decide between goodness and wickedness or between beauty and ugliness" (Weaver, 1994).

The programme began with an *Exploration Stage***,** lasting 10 to 12 weeks, in which students were encouraged to review their values, priorities, strengths, and developmental needs and helped to plan, and negotiate approval for, their individualised developmental programme. It continued with a *Progress Review Stage* running through the main study phase, in which students were helped to monitor and review their progress. And ended with a *Demonstration Stage***,** in which students set out to show what they have learnt through its application to real situations relevant to their intended career.

Once things got to the stage of evaluating both the overall programme and individual students' development, the problem, with which we are now all too familiar – namely that all the students developed in different directions (See Stephenson, 2001) – reared its ugly head. However, an ingenious solution was found. Instead of seeking to assess outcomes directly, the process of validation moved to validating the individual *programmes of study* and then testifying to the fact that the students had followed those programmes (Adams, Robbins, & Stephenson, 1981). It was argued that, if students had engaged an appropriate *process,* the outcomes … especially the idiosyncratic *knowledge* outcomes, which Lester (2001) has shown (contrary to all conventional wisdom) it is logically *impossible* to assess … would have been achieved.

It may be mentioned in passing that we have shown that similar arrangements can be made in schools. If it can be shown that a teacher has created a "developmental environment" in his or her classroom, the competencies pupils have developed become *visible*. These build on the invisible idiosyncratic, expert, formal and tacit, knowledge base the student has built up. This process could well find wider application in the evaluation of group-based personal development programmes among adults.

Something else of considerable importance may be noted in passing. A similar shift toward understanding process and *inferring* outcomes underlies a move from trying to apply positivistic, reductionist, models in evaluation toward "illuminative" evaluation based on a study of the *processes* involved. *Most* important outcomes cannot be 'measured' in the conventional sense[22].

As might be anticipated, it was not too many years before the progamme was, to all intents and purposes, closed down – in part because the external quality control agency (HMI) was uncomfortable with this shift from positivistic to illuminative evaluation methods.

But there was another interesting twist of direct relevance to the theme of this chapter. As might (with hindsight) be anticipated on the basis of what was said earlier, those discipline-based NELP lecturers who *did* set about nurturing high-level competencies were accused of un-professional conduct because they had strayed outside what was taken to be their domain of specialist knowledge (O'Reilly, 2001).

Unfortunately, are yet other barriers to generalising educational activities of the kind encountered in institutions like Oxbridge, Alverno, and NELP.

One group of these relates to values conflicts. This will assume increasing importance as this chapter progresses. At one level it can be said that the most important problem in education is to come to terms with values, and that is indeed the subtitle of one of my most important books (Raven, 1994). Although I did not emphasise it when discussing the Home Visiting programme above, the Home Visitors were deeply disturbed to discover that many of the parents they visited did not share their own priorities about reading, intellectual development, encouraging enquiry and questioning, or appropriate discipline strategies.

Again, although I did not mention it at the time, many of the barriers to the introduction of competency oriented education into schools arise from such things as being unable to cope with the tension between those pupils who want to develop "toughness and strength" and those who want to develop the sensitivities required for artistic or scientific creativity. How is a teacher to cope with such incompatible demands in the same classroom? If teachers set about the apparently straightforward task of creating a "thinking classroom" they soon discover that many parents do not want their children to be asking questions – let along challenging authoritative viewpoints.

Public institutions have to cater for all comers … yet little thought has been given to how to cater for the variance between those comers.

One reason why colleges like Bennington and Alverno are able to do what they do is that they are not plagued by this variance in "demands". They can unashamedly pursue value clarification activities and encourage ethical commitment to a purpose.

But there are still other barriers to wider dissemination of competence-based education into Universities. Schön and Argyris spent over a decade trying to introduce activities designed to promote the kinds of competence that Schön had shown to be so important in *The Reflective Practitioner* into MIT. They failed miserably (see *Educating the Reflective Practitioner*). One reason was that the lecturers were not much interested in promoting the competence of their students. They were locked into a framework in which the publication of bullet-proof studies within their disciplines was the primary requirement. The peer review process ensured that publications putting forward insights which went *beyond* the data but were not tested *within* them would be rejected. More specifically, this prohibition extended to most research adventuring outside what were currently conceived to be the boundaries of the "discipline". Clearly such lecturers provided no role model for ethically-guided comprehensive research and action.

Less expected was the reaction of the students. Basically, they said "No one can tell if I am a competent manager or not. So what I will have to do is focus on getting myself promoted. That means parading the latest "in" terms and phrases in front of my boss. That is exactly what the entire "educational" system has encouraged me to do and advanced me for doing. No problem.

So here we have further insights into why the educational system as a whole does not do the things which most people, in a sense, want it to do and which are, in fact, the most important from the point of view of nurturing occupational and societal competence. Handling them requires systems thinking: How does the system work? What is driving it? How can I deal with some of the constraints which prevent me doing what should be done? These themes will become a major concern as this chapter progresses.

Although marginally out of place here, this is an appropriate place to mention that, as Hughes (1998) has shown, some forms of group based personal development programmes for adults *can* be successful .. although demonstrating this demands the adoption of methodology that is widely considered unacceptable. (In short, we can hold out some hope for those who wish to offer competency-oriented professional development programmes in psychology but warn them that they will encounter unexpected difficulties!)

Developing Competence in Workplaces

The way in which managers nurture the talents of subordinates emerges incidentally, but in a most interesting and revealing way, in a study conducted using Behavioural Event Interviewing by Klemp, Munger and Spencer in 1977. But to understand the significance of what these managers (actually naval officers) were doing in the staff development area, attention must first be drawn to some of the other things they did that differentiated them from other officers. Even though they were working in what might be taken to be an archetypical command-and-control organisation – the US Navy – one of the most striking things these officers did was initiate new developments themselves: they did not wait to be given instructions. Like Hattie's teachers, they publicly set goals, encouraged feedback from their subordinates to help them monitor how well things were going, *and changed the goals if it emerged that the goal was inappropriate or that problem was not what it had been taken to be.* Likewise, they did not sit around complaining about the orders that came from higher up in the hierarchy, they got together with other officers at their own level to influence those above them. They themselves did not issue orders but set about mustering arguments and persuading people to do the things that they felt needed to be done. And they did not offer punitive feedback but rather encouraged people to monitor the effectiveness of their own behaviour and change the goals and the strategies where necessary.

So here indeed were some distinctive role models[23] from whom subordinates could learn how to behave. But then these officers engaged in some distinctly unusual activities to facilitate the development of subordinates. On the one hand, they, like the effective lecturers we met in some universities, encouraged their subordinates to join them in doing *their* job. (Many managers fear that, if they were to do such a thing, the subordinates would oust them from their position.) While they were working with subordinates in this way they were able to lead those subordinates not only to observe, but actually *to share in* many of the normally private components of effective behaviour. They were able to share the opening *feelings* which suggested that they had an encountered some kind of problem, their struggles as they tried to "think" about it in various ways and rejected most of their initial "thoughts" because they did not square with all the facts – in other words as they conducted mental "experimental interactions with the problem". Then, still unclear about what the problem was, they might initiate some kind of overt action, quickly discover that it did not produce the desired result, and use this feedback to clarify the nature of the problem and the effectiveness of their strategy. (We may note that it is this complete set of cognitive, affective, and conative behaviours which constitutes what many conceptualise as "thinking" or "cognitive ability". Psychologists' general neglect of its affective and conative components has been responsible for many errors in research in these areas.)

But another thing they did – and this has emerged perhaps more forcefully in other studies of what distinguished more from less effective managers – was come to realise that particular subordinates was not predisposed to engage in the kinds of activity that they themselves found most attractive. So, recognising that organisations require (even in management) a wide range of people who do very different things, they tried to locate a manager who shared the subordinate's motives and arrange a transfer. In this way they recognised that people will not develop important components of competence unless they are working with someone they seek to emulate.

And this is an appropriate opportunity to mention a couple of things to which I did not draw attention earlier. One is that some of the effective elementary school teachers whose work was described, recognising that they themselves were not appropriate role models for some of their pupils, sought to place pupils with appropriate mentors outside the school. Not only did they send those pupils who were scientifically oriented off to work with scientists engaged in research at the cutting edge of advancing understanding (of e.g. river pollution), they also placed others with members of the community who shared those pupils' enthusiasms and values. More generally, they encouraged their pupils to identify characters in literature or history whom they would have liked to emulate and encouraged them to make explicit the components of competence which led those characters to be effective in that particular way.

Where did these teachers learn to do these things?

Now, that's an interesting question in a book concerned with professional development!

We may start by mentioning that it was *not* in colleges of education. Research carried out in connection with the Sneddon Report (1978) and its follow through (Raven, (1987 a & b) found that most teachers said they had learned to teach on the job and that college education had been of little value.

What of the 5% or so who orchestrated activities such as those we described earlier and who are perhaps the only ones who are legitimately able to claim to be educators?

We found they were extraordinary people. In the first place, they had been led to do what they did by a combination of a commitment to education and development on the one hand and a horror of what schools were doing to pupils on the other. Both are required. (Many of those who go into teaching because they want to help children develop are shocked at what they find and simply drop out.)

Our teachers then sought positions (such as work in small community schools) from which they could actually have some effect instead of having their work undermined by what others were doing. They then set about developing the necessary strategies and ways of thought. In the end, they describe their strategies as "intuitive", but that is misleading. We found that they had spent perhaps 20 years developing them. Among other things, they had arranged to *go and work with,* not merely visit, other teachers whom, they have heard, were doing something worthwhile.

But they did not only work *in* their schools. They spent an enormous amounts of time *outside* them seeking to influence the constraints which would otherwise have prevented them doing what they could see needed to be done. They spent a lot of time with parents explaining and justifying what they were doing. They persuaded administrators, inspectors, and head teachers of other schools that the available tests of the "3Rs" told one little of value. And so on.

At this point we may briefly revisit the question of what constitutes occupational, and especially professional, competence among teachers and psychologists.

The most obvious point is that one cannot expect *most* teachers to engage in the behaviours just described.

It is up to psychologists and educational researchers to elucidate the conceptual frameworks that are needed to think about competence and development in these ways --- and then to develop the tools that are required to implement the individualised developmental programmes conducted in group settings that are necessary and testify to the outcomes in pupil and staff appraisal exercises and educational evaluation more generally.

Failure to do these things is both unprofessional and unethical. It is a serious sin of omission. But getting to the point where we *can* do them not only requires the same energy, determination, and commitment as our teachers displayed, but a change in the definition of professional behaviour and competence adopted by our professional organisations. More than that, it requires change in research priorities, the criteria for what constitutes good research, and even the definition of "science" itself.

Assessment

One of my objectives in this chapter has been to alert readers to some of the dangers inherent in thoughtways and procedures commonly advocated in universities and liable to be taught in continuing professional development courses in the education/human resources area and to suggest ways in which psychologists could, instead of taking courses, contribute to the continuing development of their profession.

So the logical next step is to turn to the assessment of competence.

But, before doing that, it is useful to highlight some fundamental problems associated with the concept of evidence based practice, and especially the notion of payment by demonstrated results; in education, personal development, and psychotherapy.

Most of the researchers working in the area have more or less proceeded on the assumption that "nothing could be simpler" than demonstrating change (or the lack of it). Simply administer some test before and after an intervention and subtract the initial from the subsequent scores.

Nothing could be more misleading! In the first place, as we have seen, there are not, and, if one works within the traditional measurement paradigm, cannot be, "measures" of the most important outcomes (or, to tell the truth, measures of the inputs or processes involved). The effective study of processes calls for the adoption of an ecological-type model with many and recursive feedback loops.

But, even if one ignores these problems, it emerges that most of the studies are extremely misleading and damaging. Yet they have had dramatic effects on practices and procedures which influence millions, if not billions, of people worldwide.

In actuality, we are here talking about what might be taken to be a number of different things: 1) the assessment of (relative) change in groups over time or in response to different treatments, including such things as administrative arrangements – such as "streaming" vs "mixed ability" teaching on "less" vs "more able" students (that was what Hattie's meta-meta-analysis of 800 *meta*-analyses of tens of thousands of studies was all about), 2) the demonstration of *individual* change so as to be able to do such things as compare the relative effects of different treatments (e.g., drugs) on the same individual, and 3) the calculation of individual responsiveness – gain – *scores*, as in the calculation of personal "learning potential" scores by subtracting the pre- from post-intervention test scores (these difference scores then being correlated with other variables in an effort to do such things as clarify who responds).

One basic problem, although it is not the most fundamental, is that, incredible as it may seem, tests developed according to Classical Test Theory are unfit for (this) purpose.

The basic problem is that such tests do not yield equal-interval scales. Thus a score difference of, say, five points at one point in the scale is not the same thing as a score difference of five points at another point in the scale.

One implication of this is that the conclusions drawn from, for example, the thousands of studies purporting to compare the relative gains made by "more" and "less" able students in response to alternative educational and administrative practices are open to serious question. In fact, as Prieler & Raven (2008) have shown, it turns out that the findings can be easily reversed by even such a simple change as employing a test of the same "ability" but having a different level of difficulty.

Likewise, since a "learning potential" (gain) score of five means very different things at different points in the scale, any attempt to relate such scores (without reference to the point in the scale from which they are drawn) to other things, such as "environmental" (e.g., socio-economic) variables are likely to be seriously misleading and willingness to remunerate those offering remedial educational services or psychotherapy may vary dramatically with the initial "ability" of clients.

In technical terms, the truth is that such change scores are heavily dependent on: 1) the absolute difficulty of the test, 2) the shape of the Test Characteristic Curve, and 3) the sector of the curve on which the change is measured (see Appendix B and Prieler & Raven, 2008 for details). To solve the problem it is necessary either to generate tests having linear Test Characteristic Curves or to make

complex calculations using speciality computer programs of the kind developed by Fischer & Selinger (1997)[24].

The second basic problem arises from the tendency of most evaluators to focus on single outcomes in a manner not merely encouraged by, but often demanded by, reductionist science. Yet any educational or developmental process has a range of outcomes, some of them desired and desirable, some undesired and undesirable, some short and some long term, some on individuals, some on society (what is good for the individual may be bad for society), and varying from individual to individual.

The problem may be captured by saying that most evaluations purporting to support "evidence based practice" are insufficiently *comprehensive.*

In fact, as Prieler and Raven (2008) show, two important transformations in conventional thinking emerge if one pursues this issue. One is that the quality of an evaluation is to be judged more in terms of its *comprehensiveness* (its ability to get a rough fix on all important outcomes for different sorts of people, for individuals and the society in which they live, and in the short and the long term) than, as is usually the case at present, by the accuracy of its measures of particular outcomes or the "sophistication" of its analytic techniques.

Scientists thralled to positivistic reductionist science are typically preoccupied with accuracy in the measurement of single variables, often with scant regard to the construct validity of the measures or the generalisability of the findings. Few regard this as unprofessional. But it can have extremely serious consequences. In agriculture, for example, it leads to evaluations which even neglect the long-term effects on yields of the pesticides being "evaluated", not to mention their effects on food chains or wider aspects of soil fertility. In management and economics it leads to the promotion of activities which can be considered nothing short of disastrous. In psychology it leads (as Kazdin, 2006 has shown) to such things as the discreditation of psychotherapy programmes which actually confer important benefits and, in education and management, to the neglect (indeed invisibility) of many important talents (Raven, 2008). In due course, this neglect of these wider talents leads to the production of monocultures of mind (thus stifling the evolution of new ideas) and the cementation of a hierarchy which generates, and requires participation in, jobs which consume endless renewable and non renewable resources in such a way that they are destructive of habitat and thus the survival of the species. What could be more unethical, more unprofessional? Ironically, this neglect of the ecological, this focus on hierarchy, seems, as we shall see, to be driven by a network of social forces which, since they dramatically determine human behaviour, must be viewed as being of central importance to any science which claims to be concerned with understanding and predicting human behaviour. Yet study of them would currently be regarded as outwith psychologists' area of professional competence.

Unfortunately, even these observations overlook still more important problems. Many effective educational/developmental processes are *transformational.* They do not result in people becoming "better" or "worse" along some predetermined "dimension". Instead they do such things as release previously existing components of competence into some activity the potentiality of which was not previously even suspected (see, for example, Jackson, 1968 for schoolchildren, Stephenson, 2001 and Winter et. al., 1977 for University students, and Hughes, 1998 for adults.)

Kazdin (2006) has underlined similar points in relation to psychotherapy. It *cannot* be meaningfully evaluated using a few pre-determined tests.

But worse is to come. These competencies are not merely released or triggered by some chance encounter with another person or problem. Their very existence depends on there being a supportive, if not necessarily congenial, context. And the effects of these collective interactions emerge not merely at the individual level (as in, for example, the strength of a single plant) but, more importantly, in a form that is analogous to an index of the viability of an ecological niche in a particular context. Suffice it to say that, in a single field, there are many hundreds of types of grass, no one type being the "fittest" in any general sense, and that the proportions of different strains varies with the balance of other plants, animals, and nutrients within a huge variety of niches.

Because many readers will regard the injunction to provide something approaching a comprehensive evaluation as unrealistic, it is necessary to say something briefly about methodology. Of course, no single study can yield all the information needed to do this. Nevertheless, failure to set it as an almost compulsory objective of any evaluation worth the name leads to failure to even consider some of the outcomes that ought to be studied. Besides, one form of "illuminative" methodology *does* allow one to approximate the ideal. Study of the *processes* that are operative allows one to infer what the outcomes are *likely* to be. Of course, the more these inferences can be backed up by documentation the better. But, since there are no measures of most of the most important processes or outcomes, demanding something approaching full documentation becomes diversionary. Worse, if it is true that, as Deming (1980) says, only 5% of what is important about organisational functioning is measurable at this point in time, attempting to guide organisations or society on the basis of only that which is measurable becomes unconscionable … but this is precisely what most of those promoting "evidence based" management, health care, educational policies etc. are trying to do.

I now return to a point I made earlier: Testing pre-formulated hypothesis is not the objective of scientific research. The objective is to advance understanding. As Donnison (1972) has argued *it is the insights built up in the course of research that are important*. Thus the important results of a particular piece of research are, not what is documented *within* it, but the insights built up in the course of it. Such insights will often challenge accepted interpretations of data that have been taken at their face value. Viewed in this way, what has come to be described as "illuminative" research becomes much more acceptable[25].

These observations point to some of the most basic problems with research in the area. To move forward it will be necessary to move away from the kinds of procedures embraced by reductionist science to those hinted at in our earlier references to "illuminative" research and what might be described as an "ecological" image, not merely of the educational process, but of science itself.

Once again, the dangers are clear in relation to requiring psychologists to   ehav in "professional development" courses built around the received wisdom. More than that, in this case, it is apparent that there is a need for professional commitment to work *outside* the profession to undo the damage that has been caused by basing policy on studies that have, in the past, adopted inappropriate methods and procedures.

The Assessment of Competence

In reality, the task of developing tests and procedures which could more legitimately be used to measure aspects of change is the least of the problems to be tackled by psychometricians.

As can be seen from the work reviewed earlier, our current psychometric procedures fail to recognise most of the talents most people possess. They make it impossible to mount meaningful evaluations of educational and clinical programmes and policies. Worse, as Spearman noted, their use within schools drives education out of these institutions because they focus teachers', pupils', parents', employers', administrators' and politicians' attention on the goals that are assessed (but actually using tests that lack both construct and predictive validity) and thus deflect attention from the qualities people possess and which society ought to set about nurturing and utilising. What could be more unethical?

I should perhaps take a couple of minutes to justify the statement that most of the tests used in schools lack construct and predictive validity.

Concerning predictive validity, it is now well known from the meta analyses of Schmidt and Hunter (1998) and their co-workers that scores on educational tests have little predictive validity outside the school system. Indeed, as Berg (1973) showed long ago, they do not even predict the ability to do well in courses in the same subject area a few years later.

As to construct validity, I have already laboured the point that they cannot legitimately be viewed as ways of assessing the knowledge people possess because their most important knowledge is both idiosyncratic and tacit.

We may now draw attention to something else. Few of the tests used in schools merit the names they are given. Thus, few of the tests claiming to measure "scientific ability" seek to assess scientific *competence* of the kind we encountered in some schools – the ability to problematise, conceptualise, formulate (unverbalised) hypotheses, invent ways of investigating them, and notice and reflect on the implications of unexpected outcomes of such investigatory experiments. Still less do they seek to assess the competencies of the *professional* scientist as articulated by Schön – the willingness to explore such things as the social and environmental consequences of any action that might be envisaged. (The Schools Council Integrated Science Project both encouraged and assessed consideration of such issues. The result was that the Director was ordered to leave the country.) Few "reading" tests assess even such things as the ability to use structure to find information related to one's purposes, let alone the ability use lateral thinking (time *off* task) to arrive at insights which *do* relate to ones purposes. They discriminate *against* those "dyslexics" who use what might be termed a form of speed reading to generate an understanding of what is said in a paragraph without being able to "read" the words. Tests of mathematical ability come nowhere near assessing the ability to find a form of mathematics suited to testing the logic of an argument, describing a situation of concern to one, or summarising data. Even arithmetic tests fail to predict the ability to apply what has been learned to directly parallel problems, let alone the ability regenerate the correct answer to simple arithmetical problems once the taught algorithm has been forgotten (which is typically a couple of years if the person concerned does not practice the operations in the interim). (A fuller discussion of these issues will be found in *The Tragic Illusion: Educational Testing* [Raven, 1991])

But all these observations are really beside the point. This is that psychologists have failed to provide parents, teachers, university lecturers, managers or any of those involved in personnel development, assessment, and selection with appropriate ways of thinking about and identifying the diversity of talents that are available. As a result, neither educational nor psychological researchers are able to mount meaningful evaluations of individuals or educational programs or policies.

A vague awareness of these things combined with much more articulate unease about the uses to which test scores are put has led to widespread criticism of testing.

The response of bodies like the International Test Commission has been interesting, if predictable. It has been to retreat into specification of technico-rational requirements for tests and testers. These rely heavily on widely endorsed, but poorly understood, concepts like "validity". Yet, as Messick (1995) and I have shown, one cannot validate tests by following the procedures widely advocated in text books … least of all by looking at tables showing the correlations with other tests purporting to measure "the same" thing. As mentioned above, such things as creativity and "the ability to think" are all difficult and demanding activities which no one will engage in – let alone display – unless they are undertaking an activity they care about. And, even then, as we have also seen, they do not "think" in the ways "cognitive psychologists" might expect and look for. Thinking is a complex cognitive, affective, and conative activity. One has somehow to "get inside peoples' heads" to find out what they are doing.

Laudable though the objective of setting standards like these may be, their *effect* is to render many important personal qualities and the effects of policies and educational and social activities invisible. Since there are no good measures of the main objectives and outcomes of the kind of interdisciplinary, competency-oriented, enquiry-based, education discussed earlier, the requirement that only reliable and valid tests be used in their evaluation induces researchers to use only *irrelevant* tests unrelated to many of the objectives or unintended and undesirable consequences of both the programmes being evaluated and any programmes with which they are compared. Thus, many governments have commissioned evaluations of what have been termed "progressive education" programmes. These report that they do not enhance reading levels as conventionally assessed. But they are unable to identify the benefits of the programmes – even in the reading area – or the undesirable effects of conventional educational programmes. This leads politicians and administrators, who in any case favour direct instruction, to insist that the "progressive" programmes be closed down. As Kazdin (2006) has put it, such standards lead evaluators to employ what amount to arbitrary selections of measures unrelated to either the objectives of the programme or any analysis of its probable effects. This not only renders the positive outcomes of these activities invisible, it also ensures that many negative effects, especially of conventional educational activities and health care programmes, go undetected and undiscussed – indeed they become almost undiscussable.

Barriers to the Development of an Effective Education System and a Preliminary Discussion of the Management and Organisational Issues Involved

As we have seen, there are many reasons why schools tend to neglect their main goals. These include the absence of a shared, formal, understanding of how to nurture the desired qualities and how to find out whether one has done so, and, especially, how to nurture and recognise the huge variety of talents which are to be found in any school classroom. They include an inability to handle the value conflicts which surface as soon as one tries to introduce educational programmes which actually set out to nurture high-level competencies or promote diversity. They include an inability to initiate a network of experiments aimed at different aspects of "the problem" and make appropriate arrangements to learn from those experiments.

We may comment on the issues raised in the last two sentences.

So far as I can see, handling these values conflicts involves the creation of a variety of distinctively different educational programmes which actually do nurture different talents, documenting the differential consequences of these in a comprehensive way (and we now know what *that* means), and feeding that information to the public so that they can make informed choices between them. This stands in stark contrast to the notion that (very limited) information deemed relevant to such decisions should be fed upward in a bureaucratic system to politicians who take decisions binding on all. In short, it involves the evolution of new concepts of bureaucracy and democracy (see Raven, 1995, 2000, 2010a).

It is often suggested that the best way to create the requisite variety and choice is to privatise education and turn it over to the market place. This is not the case. The market rarely generates genuine alternatives[26] and even more rarely mounts comprehensive evaluations documenting the short- and long-term, personal and social, desired and desirable, and undesired and undesirable consequences of alternatives. It is unable to differentiate between the *sociological* benefits and disbenefits and the *educational* benefits and disbenefits. Unless there is a concerted effort to develop means of testifying to possession of the wider competencies discussed in this chapter and insert them into the social allocation process, people will opt – do opt – to purchase the former and neglect the latter despite the fact that it is the latter which are most important to individuals and society. It depends on everyone having the   ehaviour   o to make effective choices and on those choices being available. Besides an educational system is intended to benefit everyone … not just those who can pay. Perhaps most importantly, as we shall see in more detail later, the market ideology has been hijacked by the most powerful members of society and used to legitimise its opposite, namely centrally-directed command-and-control arrangements. Whereas money was intended to be the ball bearings, as it were, of a self-managing system, those with power have developed arrangements whereby the control of cash flows is used as a management tool. The danger is that they would deploy this control of the mythical marketplace to favour their own interests rather than those of the general population. (I have shown elsewhere, [Raven, 1995] that this is a reality, not an idle speculation.)

So, whose job is it to carry out the activities listed earlier? As far as I can see, it has to be the job of public servants. This means that their job is to create a variety of options in every community, to ensure that they are comprehensively evaluated, and to feed this information to the public. More fundamentally, it becomes their job to promote a ferment of innovation and learning. This means encouraging everyone in the system to experiment in their own areas and to support those trying to do so in related areas. It means facilitating the evolution of comprehensive evaluations. It means facilitating a move away from methodologies grounded in positivistic thinking and promoting an understanding of the kinds of "illuminative" methodology discussed earlier and, in particular examining the results of the experiments that have been initiated to draw out their implications for understanding the currently invisible *systems* processes that are deflecting the activities from their goals. Creating a ferment of innovation also means acting on the information which becomes available in an innovative way – i.e. as part of a recursive cycle of experimentation, learning and adjustment.

If they are to do these things, there will need to be a sea-change in beliefs about the role of public servants. It will be necessary to generate new job descriptions for them. These will need to include such things as requirements that they seek out information and act on it in an innovative way in the long term public interest – in short that they act as professionals. And it will be necessary to evolve new staff and organisational appraisal systems to find out how well they are doing.

How to get them to pay attention to such evaluations of their work? The answer was, in some sense, provided by John Stuart Mill in 1859. One way to make it more likely that they will act in the long term public interest instead of their own personal interests is to expose their behaviour to the public gaze. Or, as Mill put it, making "visible to everyone who did everything and by whose default anything was left undone". So what is required is a network of overlapping monitoring/supervisory groups as distinct from a form of accountability supposedly feeding information through extended bureaucratic chains to distant multi-purpose assemblies composed of what Adam Smith (1776) and John Stuart Mill described as committees of ignoramuses. Would the public participate in such arrangements? Make no mistake about it, when people can have an *influence* – as is very rarely the case in the context of what currently passes for democracy – they participate.

In reality, despite the negative comments I have made about the market process, it is important to understand the problem it was meant to solve and how it was meant to work. Adam Smith (1776) and Fred Hayek (1948) advocated it as an answer to a very basic question which is still with us, namely how to create a society which will innovate and learn without central direction; one which will harness the expert information which is widely dispersed in the hearts, heads, and hands of billions of people. The proposal was for an *organic* system with multiple feedback loops which did not depend on decisions by committees of wise men. Indeed, it was argued that the very concept of a wise man was an oxymoron. The reason was that, if someone initiates some activity at one location and someone else at another location no-one can tell in advance what will happen when the two things come together. To pick up Ridley's (2010) memorable image, the problem is to facilitate the process whereby ideas evolving in different ecological niches have sex with each other and produce unpredictable, previously unimaginable, outcomes! It follows that, as Smith asserted, key information required to take wise decisions not only is not, but *cannot,* be available. On the other hand, through the market process, individuals could use their pennies to influence on the direction of development. They could "vote" separately on thousands of issues. They could invest in enterprises they liked the sound of and choose between a myriad of goods and services. They did not have to vote for politicians (whom they did not trust) offering only alternative *packages* of policies and largely unresponsive to feedback. They could change their decisions over time as they saw how things worked out.

For a variety of reasons which go well beyond those mentioned above, the market mechanism does not and cannot deliver the desired benefits[*]. It is up to psychologists to come up with a better answer to Smith and Hayek's question based on our understandings of organisational arrangements, the sources of (and deterrents to) managerial and professional competence, staff guidance, placement, and development systems, and staff and organisational appraisal systems. And we need to do so pretty quick since the two main models competing for public attention at the present time – current forms of "the market" and current forms of politico-democratic management via bureaucracy – are widely discredited, thereby producing alienation and apathy.

A Re-formulation of the Problem

To re-state the problem in other terms: The need is for a better design for a socio-cybernetic system for the management of society.

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[*] The reasons are spelt out in my *New Wealth of Nations* (Raven, 1995). But they include the following: (a) many costs are externalised to other countries and the future; (b) prices are primarily determined by public servants, not by the costs of land, labour, and capital; (c) the market process does not take into account a great deal of important information (such as that relating to long term effects, especially concerning sustainability); and (d) does not deliver high quality of life because this mainly depends on things (like clean air, absence of plague and disease, and networks of friends) which cannot be commoditised and purchased individually.

To clarify. Cybernetics is concerned with the study of guidance and control systems in animals and machines. One has to say animals, otherwise people think only of man-made systems, like missiles. But as soon as one says animals it is clear that one is concerned with understanding guidance systems which depend on multiple, non hierarchical, feedback loops. So socio-cybernetics is concerned both with understanding the social forces which control the behaviour of people in society (and regularly undermine well intentioned social action) and designing better socio-cybernetic guidance systems for the management of society.

Since psychology is centrally concerned with understanding the causes of human behaviour, it is clear that they should be playing a major role in developing an understanding of these processes and helping to design a better management systems for society.

Turning now to the last issue mentioned when summarising the problems which need attention if we are to create an effective educational system (and it is directly related to those just mentioned), namely the need to create a ferment of innovation, experimentation and learning. There are so many things to be done that they could not be centrally decreed. No blueprint is possible. The question then is to how to create a *learning society* – a society which will innovate and learn *without* central direction[27].

But the *most* important lesson we learned at this point in our work was that the contributors to the abject failure of the so-called educational system do not operate independently but form a network, or system (using the word in another sense), of recursive and mutually supportive social forces. This network seems to have the capacity to perpetuate, even extend and elaborate, itself. It becomes virtually impossible to change any one part without changing others – otherwise the changes one has made are either negated by the reactions of the rest of the system or produce unanticipated, and often unwanted, changes elsewhere.

This network of feedback loops is sketched in Figure 1.

Figure 1: *Feedback Loops Driving Down Quality in Education.*

Among other things, the Figure shows:
1. That the dominance of the activities with which schools are preoccupied arises from:
    (i) A series of sociological imperatives (e.g., that schools assist in legitimising a hierarchical society and deciding who will be promoted into the higher ranks). (It follows from this – and this has important implications for the way we tend to think about solutions to the problems reviewed earlier – that what happens in schools is not mainly determined by the wishes of parents, teachers, pupils, employers, ministers of education or anyone else but, at least to a significant extent, by what is assessed in the sociological process of allocating position and status.);
    (ii) Inappropriate beliefs about the nature of the changes that are needed in education itself, the management of the educational system, and the management of society;
    (iii) Society's failure to initiate research which would yield useful insights into such things as the nature of competence and how it is to be fostered and assessed;

(iv) The absence of (a) systematically generated variety in, and choice between, educational programmes which have demonstrably different consequences and (b) information on the consequences of each of these alternatives;

(v) Failure to create climates of innovation within schools[28] and

(vi) Inadequate dissemination of the results of research into the nature, development, and assessment of generic high-level competencies, and, especially, the implications of the values basis of competence.

2. That this narrow educational process has a series of knock-on effects which finally contribute to its own perpetuation. The competencies and beliefs that are nurtured and inculcated in schools reinforce a social order which offers major benefits to "able" people who do what is required of them without questioning that order. That society creates endless work which gives meaning to people's lives (but does little to enhance the general quality of life) and creates wealth at the expense of the biosphere, future generations, and the Third World. The formal and informal "educational" system helps to teach a host of incorrect beliefs which collectively result in nothing being what it is popularly or authoritatively said to be (for example, the educational system itself claims to be about promoting the growth of competence when it in fact mainly operates to engage vast numbers of people in "teaching" and "learning" activities of little educational merit but which ensure that those who are most able and willing to challenge the fraudulent nature of the system are routed to social positions from which they can have little influence while those who are least able to do anything except secure their own advantage are promoted into influential positions in society). This double-talk makes it extremely difficult to conduct any rational discussion of the changes needed in society. The sociological imperative that schools help to legitimise the rationing of privilege contributes to the demand for, and encourages acceptance of, narrow, invisible, and mislabelled assessments. Those predisposed to acquire these "qualifications" are not inclined to see the need for, or to commission, genuine enquiry-oriented research or notice other talents in their fellows. Teachers who become aware of the hidden competencies of their "less able" students experience acute distress. The lack of understanding of the nature of competence leads to a failure to underline the need for a variety of value-based educational programmes and thus to the perpetuation of narrow educational activity.

3. That the main motives for change are widespread awareness that there is something seriously wrong with the educational system, and, more specifically, that it fails miserably in its manifest task of identifying, nurturing, recognising, and utilising most people's motives and talents. The most commonly proposed solutions to this problem, based as they are on other misunderstandings, are, however, inappropriate. However, another motive for change stems from increasing recognition that we have created a non-sustainable society and that basic change in the way society is run is essential.

4. That there are a number of points at which it should be possible to intervene in this network of feedback loops to create an upward spiral. These might involve:

(i) Changing the way we run society, introducing more, and more appropriate, social research and evaluation activity, and finding ways of holding public servants and politicians accountable for seeking out and acting on information in an innovative way in the long-term public interest;

(ii) Introducing the "parallel organisation" activities* that are required to promote innovation within schools;

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* See Endnote 7.

(iii) Establishing a greater variety of distinctively different, value-based, educational programmes and providing information on the short and long-term, personal and social, consequences of each;

(iv) Creating public debate about the forms of supervision – the nature of the democracy – needed to ensure that public servants seek out and act on information in an innovative way in the public interest and,

(iv) Disseminating what is already known about the nature, development, and assessment of competence and its implications.

Standing further back from the figure what we see is that:

1. It is impossible to achieve significant benefits by changing any one part of the system … such as curriculum or examinations or teacher training on its own … without simultaneously making other changes – otherwise the effects of the change will either be negated by the reactions of the rest of the system or produce counterintuitive, and usually counterproductive, changes elsewhere. On the other hand, it is equally clear that command-and-control-based system-wide change based on uninformed opinion will achieve little.

2. Pervasive, *systems-oriented,* changes are required to move forward. But these changes, although collectively system-wide, cannot be centrally mandated because there are too many new things to be done.

3. Since what happens is not determined by the wishes of any particular group of people but *by the operation of the system itself* the widespread tendency to single out and *blame* parents, pupils, teachers, public servants, or politicians is entirely inappropriate. *Their* behaviour is mainly determined by the system. One needs to take these systemic forces seriously and ask how they can be harnessed in an analogous way to that in which marine engineers harness the potentially destructive forces of the wind: They will not go away!

4. It is vital to generalise the observation made in (3): We need to fundamentally re-frame the way we think about the causation of behaviour in a way which parallels one of the transformations Newton introduced into physics. Before Newton, if objects moved or changed direction, it was because of their *internal* properties: they were *animated.* After Newton it was mainly because they were acted upon by a network of invisible *external* forces which could nevertheless be mapped, measured and harnessed. Observation (3) implies that we need a similar transformation in the way we think about the causes of human behaviour[*].

5. The network of forces depicted (a) has the effect of driving attempts to deal with the problems based on single-variable common-sense interventions ever more narrowly, and ineffectively, around the triangle at the top right of the Figure, and (b) diverts attention from the developments, indicated in the bottom part of the Figure, that are so essential to move forward.

6. The *causes* of the symptoms (and thus the appropriate place to start reform) are far removed from those symptoms.

7. The system does not merely reproduce itself – it leads to the production of ever more elaborate versions of itself; it is self-elaborating; autopoietic[†].

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[*] See Appendix A for a fuller discussion.

[†] i.e. In some sense self-organising, self-reproducing, and self-extending. The problem with the word "self-organising" on its own is that it is frequently taken to absolve the user from the need to explain how the process works. What we have seen here is that the "self-organising" processes of the educational system involve a whole series of mutually reinforcing and recursive feedback loops both within the educational system and in relation to the wider society.

In the foregoing, we have repeatedly used the word "force". We must now take up the question of the nature, or status, of the "forces" depicted. At the most basic level, Figure 1 is analogous to a map of the interacting gravitational forces controlling the orbits of the planets. But the nature of the *social* forces involved has yet to be elucidated. What is clear is that the links in the figure are not flows of e.g., resources as in the models developed by Meadows et al. (2008). Nor are they flows of "information" as in networks of e-mails. Nor are they flows of e.g., people from one section of the "educational system" to another. The contents of the boxes are not people or stocks of food or components. Only if the feedback loops do really represent *forces* in some sense analogous to the physical forces represented in the diagrams of physics does it make sense to ask how they can be harnessed (as in the forces acting on a sailing boat[*]) or amplified or damped down (as in electrical energy flowing through a radio).

Put like that, it suggests that the need is to find ways of mapping, measuring, and harnessing social forces in a manner analogous to those adopted by physicists and engineers. And I have spent many years trying to do this [see e.g. Raven & Navrotsky (2001) and Raven & Gallon (2010)]. However, as was stressed earlier, the field of cybernetics encompasses the study of such things as the multiple, non-hierarchical, guidance and control systems that operate within organisms or within ecological niches. Unfortunately, in trying to do these things, biologists and ecologists encounter much the same problems as we do here.

Just to spell out the implications of these observations: on the one hand, it is clear that common-sense based "solutions" to the problems of the educational system are not going to work, so there is no point in enjoining administrators, teachers, or psychologists to attend courses devoted to their promotion. On the other hand, there is endless scope for adventurous research to advance understanding in the area. Thus while, yes, there is need, through professional development activities, to release, nurture, and create conditions for harnessing all of the competencies that are so crucial to the creation of cultures of innovation and intelligence, the chief focus of professional development activities has to be on finding ways of enabling and encouraging all members of the profession to contribute to the development of the profession. Paradoxically, doing *that* will mean working *outside* our areas of certified professional competence.

Common-Sense-Based Intervention in Complex Cybernetic Systems has Counterintuitive and Usually Counterproductive Results

At this point it is worth going on what may initially seem to be a slight digression.

We have mentioned that common-sense based single-variable interventions in cybernetic systems tend to have counterintuitive and usually counterproductive effects.

A number of dramatic illustrations can be found in Forrester (1971) which deals with ecological problems which will affect us all. Forrester mapped and weighted the (often recursive) linkages (feedback loops) between the main economic and bio-physical resource variables contributing to such things as world population, pollution, per capita food supply, and quality of life. (A simplified form of this map, or model, of the overall cybernetic system is available in Raven & Gallon, 2010.) In due course, this yielded the predictions, or scenarios, which formed the basis of what is generally known as the "Club of Rome" report *Limits to Growth* (Meadows et al., 1972). [An update was

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[*] A brief description of the way in which this is done may be found in Appendix A.

produced in 2004 and the systems map (model) itself is now available in downloadable and interactive form (which enables the user to see the effect of any intervention he or she might like to test) in Meadows et al. (2008).]

Unlike the normal, and incomplete, mental maps we all carry around in our heads, and are used as a basis for most government planning, each assumption built into this model is explicit and can be subjected to scrutiny – and, in the Meadows et al. (2008) downloadable version changed at will.

The main difference from our map of the forces controlling the direction of development of the educational system is that it was possible to quantify these inputs and outcomes using standard economic and consumption indices.

Forrester gives several striking examples of the, generally counterintuitive, effects of changing some of the assumptions fed into the network.

Many of the results are dramatic and frightening, thus illustrating the importance of studying systems *qua* systems.

Figure 2 below shows the trends which, starting with estimates of conditions in 1900, would occur in the six main outcomes if things are left pretty much as they are. Under these conditions industrialization will eventually be suppressed by falling natural resources.

Quality of life peaks in the 1950s and, by 2020, will have fallen far enough to halt further rise in population. Declining resources, and the consequent fall in capital investment, exert further pressure which gradually reduce world population.
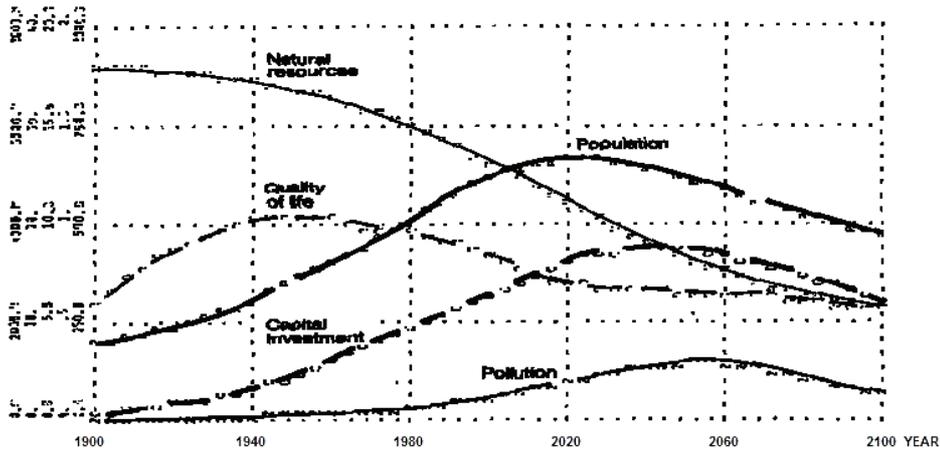
Fig. 2. Basic world model behavior showing the mode in which industrialization and population are suppressed by falling natural resources.

Forrester comments that we may not be fortunate enough to gradually run out of natural resources in this way.

Science and technology may find ways to use more plentiful metals and alternative ways of generating energy so that resource depletion does not intervene.

But, if this happens, it only leaves the way open for another growth-resisting pressure to arise.

Figure 3 shows what happens if the resource shortage is avoided.
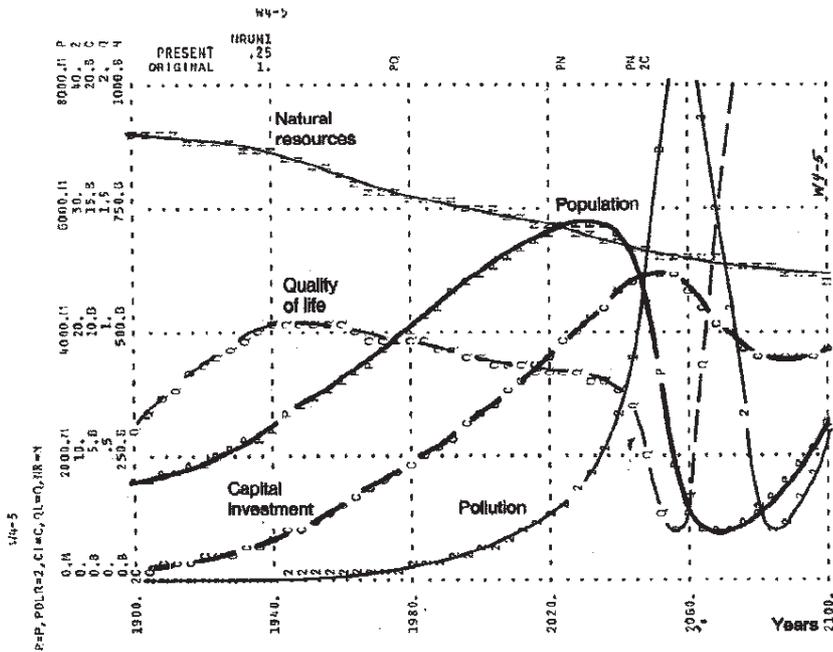
Fig. 3. A pollution crisis is precipitated by lower usage of natural resources. In 1970, natural resource usage is reduced 75 per cent by more effective technology without affecting material standard of living.

Here the only change from the assumptions fed into Figure 2 concern the rate of usage of natural resources. In Figure 3, resources are, after 1970, consumed at a rate 75 per cent less than assumed in Figure 2.

In this way the standard of living is sustained with less drain on expendable and irreplaceable resources.

The outcome is even less attractive than it would have been if things had been left alone!

By not running out of resources, population and capital investment are able to rise until a pollution crisis is created. Pollution then acts directly to reduce birth rate, increase death rate, and depress food production. In this case, population, which peaks in 2030, declines by 83% within 20 years. Forrester notes that this would be a disaster of unprecedented proportions.

Generalising: What we have here is a dramatic illustration of the everyday experience that common-sense based interventions aimed at fixing one problem within a poorly understood system create unexpected problems somewhere else in the system. More examples are given in Raven & Gallon (2010).

Implications for Socio-Cybernetics.

But at this point that we are brought up sharp. For Forrester and Meadows then say that we "lack the political will" to implement the solutions to which their analyses point.

Think about that. One of the things it indicates is that they have been unable to map and analyse networks of social forces like those which control the operation of the educational system: We are able to produce systemograms of the kind Morgan (1986) and others have generated, but it is not possible to assess and weight the relative importance of the feedback loops that are depicted so as to be able to assess the probable effect of any proposed intervention. The task of finding ways of moving forward is down to socio-cybernetricians, sociologists, psychologists, and others.

But several things *are* now clear. One is that, if one is to intervene effectively in socio-cybernetic systems, we need some basic understanding of the system we are dealing with. And then we need to make numerous, *systems-oriented*, interventions.

Ironically, generating an understanding of a system depends on diffuse experimentation *coupled with comprehensive evaluation and a deliberate effort to elucidate the implications of the effects of the action – both intended and unintended –for for our understandings the system itself.* It is quite possible that a diffuse network of such experiments might lead to some kind of assessment of the relative weights to be attached to each of the feedback loops.

But, to come back to education and reiterate a point made earlier, it is clear that what happens is mainly determined by a network of rarely discussed, mutually supportive and recursive, sociological forces. We have to come up with ways of intervening in it. One contribution might be to introduce measures of a wide range of talents into the assessments that are made at the interface between the educational system and society. Such an action would certainly alter the effects of the sociological process. But what, exactly, would they be? How could we monitor them? How could we represent them in our systemogram? Would one now say that it is *what is assessed* that plays the dominant role in determining what happens in "education"? And, yes, well, … but, what of the value conflicts involved? Indeed do not these reflections suggest that one reason why we persist with the current, almost meaningless, measures is precisely *because* they evade the problems involved in assessing anything really important … like values, honesty, initiative, critical thinking, or the presence or absence of a supportive home culture[29].

The Way Forward

In developing our map of some of the systems processes which control the operation of the so-called "educational" system, we have attempted to follow the injunctions of House (1991), Parlett (1972, 1976), and Hamilton et al. (1977) to use psychological data to illuminate a hidden network of social forces which overwhelmingly determines our behaviour and our theories. Many will claim that, as psychologists, we should not have done this or that we have "gone way beyond our data" in doing it. Yet, if we, as psychologists, wish to claim either to be serious students of the determinants of behaviour or that we aspire to apply science to benefit society, there is no doubt that we need to take the study of such forces seriously.

But clearly we will not engage with this task if we continue to work within the images and definitions of our role that we have accepted in the past. We need to actively articulate and promote a new image of ourselves and the role we can play in society. To put this another way, if we are to ferment the paradigm shifts that are required, or if we are to contribute as we would like to society, it is crucial for psychologists, *as part of our professional responsibilities,* to seek to understand, and find ways of intervening in, the omnipresent social forces which we have now seen control so much of our behaviour. Yet few of those who have noted the need for a sea change in thinking about the

nature, development and assessment of competence believe it is part of their job to try to bring it about, still less to intervene in the network of social forces we have described.

How then to design a better guidance and control system for the management of the educational system and society more generally? There are many examples of more effective organisational arrangements to be found in research into individual organisations. Examples include those contributed by Deming (1980), Johnson and Broms (2000), Kohn (1969), Semler (2001) and Erdal (2008).

Bookchin (2005) has drawn attention to something that seems to be common to these various developments by describing them as moves toward 'organic' structures. In saying this he seeks to highlight the fact that the functioning of organisms is dependent on multiple, mostly non-hierarchical, feedback processes. Most functions … such as the maintenance of body temperature … are dependent on multiple feedback processes the majority of which do not pass through the central nervous system. This is especially true in the course of organic development. The organ a cell will become and the function it will perform is determined by information somehow transmitted from both local and distal cells in the developing embryo. (It is not mainly determined by the genes in the way most people, steeped in hierarchical thinking, expect.) If the development of the embryo is somehow interfered with, the function a cell originally "directed" to some destination will perform can change so that the organism as a whole can function in the normal way.

Bookchin then notes that so it is with many preliterate societies. Many have no chief, no hierarchy, no formalised religion, no written language, and no formal government structure. And the activities undertaken by individuals within them change depending on the "needs" of the whole.

One way of summarising what emerges from many of the studies of modern organisations alluded to earlier is that organisations benefit greatly if they can move toward organic structures. And it is significant that this is a term we used earlier to characterise the societal management arrangements advocated by Smith and Hayek.

As Bookchin shows, the observation that centralised command-and-control structures run into enormous problems and generally fail to deliver high quality of life for most of those who participate in them has been made repeatedly and forcefully over millennia. Likewise, there have been endless demonstrations of the viability and success of alternatives. But the trend toward centralisation and command and control seems inexorable. It seems imperative to seek to understand it.

The Wider Context: The Destruction of Life on Earth

There is not space in this chapter to develop in any detail the claim that the autopoietic system controlling the operation and development of the educational system which we have mapped earlier is part of a wider autopoietic system controlling the operation of society. Nor is there space to fully support my claim that these processes are heading our species toward extinction carrying at least a large proportion of all known life with us.

Nevertheless, the matter cannot be allowed to pass without comment. It is now widely recognised that we, as a species, are heading toward our own extinction (e.g. Meadows et al., 1972, 2004; Oskamp, 2000; Stern, 2000; Raven, 1995, 2009b; Anderson et al., 2001; Wikipedia "Sustainability"

entry). Although these papers contain many graphs showing that numerous trends are accelerating exponentially out of control, the most striking summarising statement is that Wackernagel and Rees (1996) have shown that it would require five backup planets engaged in nothing but agriculture for everyone alive today to live as Americans do.

There is a strong tendency to attribute this plunge of homo-sapiens toward self-destruction despite widespread recognition of the need to radically change the way we live to the doings of evil capitalists. Yet our work on the educational system shows that the process has too many components to support the view that it has been designed by an elite. What is most striking is that the system has evolved further and further along its current trajectory despite the repeated demonstration that the vast majority of pupils, parents, teachers, ex-pupils, and employers want it to move in exactly the opposite direction and despite the existence of a number of alternatives.

Bookchin (2005, but see Raven, 2009a for a summary) has developed the thesis, amply supported by historical and anthropological data, that our plunge toward self destruction as a species has mainly been brought about by the creation of endless work which consumes exponentially increasing proportions of the world's resources and inflicts similarly increasing destruction on the soils, seas, and atmosphere. Furthermore, contrary to what the conventional wisdom would have us believe, this work contributes little to quality of life[30]. He argues, convincingly, that the main function[31] of this work is to legitimise, even constitute, hierarchy. The function of hierarchy is sinister indeed. It is to compel most people, often against their will, to engage in the aforesaid work. The process has continued inexorably over thousands of years despite the protests of endless thoughtful people and experimental demonstrations of the viability of alternatives. This, of course, parallels our own observations about the so-called "educational" system. As we have seen, nothing could be more serious because the outcome of this endless senseless work is likely to be the destruction of the planet as we know it. It would therefore seem that developing an understanding of, and finding ways of intervening in, this network of forces would be of even greater value than might be guessed from an examination of the educational system alone.

Seen in this light, the educational system's seemingly unstoppable quest for processes and procedures which render the diversity of talent invisible and instead create and, in a recursive way legitimise, a single-value concept of "ability" (which is not even correctly described as intellectual, academic, or "cognitive ability") is to be viewed as but one component in a network that promotes the legitimisation and cementation of hierarchy.

At this point, a little more may be said about the nature of Newton's contribution to the study of physical forces.

Prior to Newton, it was impossible for sailing boats to sail into the wind. It was recognised that they were at the mercy of the wind and the waves which often pushed them where they did not want to go and crashed them against the rocks. But there was no unifying concept of *force*. Newton not only articulated that idea but showed that it was *measurable*. Indeed the two things went hand in hand. To show that this invisible component in the wind was measurable, Newton jumped into the wind and measured how far he had jumped. And then with the wind. The difference between the two gave him a measure of the strength of this elusive thing called force in the wind. The level of measurement required to legitimise a concept does not have to be sophisticated.

As noted earlier, prior to Newton, if things moved or changed direction it was because they were possessed of animal spirits … they were *animated*. After Newton it was because they were pushed or pulled.

He also made a couple of other observations that were crucial to designing more effective sailing boats. The first was that "To every force there is always an equal and opposite reaction"; the problem is to identify it. The other is that the forces acting upon a body can be resolved into orthogonal components and thus reduced to three which in the end enable one to predict what will happen[*] – and one may then be able to intervene to ensure a more desirable outcome.

The observation that there must be somewhere an equal and opposite force to that of the wind on the sailing boat in due course led to its being found – unimaginably – in the sea. And a search for ways of harnessing that force at the same time as harnessing such forces as that of the wind on the sails led to the addition of keels to sailing boats.

These remarks imply that the first thing we have to do if we want to think about social forces is to de-animate the way we think about the processes that are seen as driving us toward our self-destruction. We have to stop blaming (and wringing our hands) our leaders and the capitalists. Instead, we have to see them as *expressions* of a network of hidden forces. They are selected and promoted and behave as they do because of those forces. What is more, people who behave in ways which resemble our leaders and capitalists are not few in number but pervade our society. Then we have to identify those forces. And, after that, take steps to harness them. A relatively naïve suggestion (which nevertheless illustrates the point) is the one we have already mentioned: including measures of a wider range of the outcomes of education in the certification and placement process which intervenes between schools and society could drive schools towards doing the things we want them to do rather than away from them. (Such a development would be the equivalent of adding keels to sailing boats.)

But the development of a relatively safe network of sailing boats depended on many other things besides the classic academic inputs of Newton and others. It also depended on the emergence of a complex socio-cybernetic system: It was necessary to accumulate a host of charts of the seas and the ports, to evolve sextants and chronometers so that ships' captains could know where they were on the high seas, to erect lighthouses, to develop means of paying lighthouse keepers, and so on and so on.

Parts of this system evolved relatively naturally, but other parts – such as the development of chronometers – required enormous, purposeful, public investment.

Nevertheless it does seem that, if we wish to move forward, we will have to find better ways of mapping, measuring and harnessing social forces (or, to pursue another analogy, to find better ways of mapping the feedback loops within organisms and in ecological niches), to facilitate the evolution of multi-component (not hierarchical and "devolved") societal management systems, and to design a much more effective system for the management of society. Note that this cannot be expressed in terms of such concepts as "decentralised" and "devolved" because the very deployment of these terms implies that our thoughtways are still pervaded by notions of hierarchy.

An incidental, but perhaps revolutionary, observation.

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[*] See Appendix A for a fuller explanation.

At this point we may draw attention to a, somewhat paradoxical, but strikingly fundamental thought that seems to have emerged in our discussion. This is that what we have said essentially involves turning psychology inside out. It means de-animating human behaviour in the way Newton de-animated the behaviour of moving objects. It means attributing much of what we and others do to the invisible social forces that act upon us. Of course that is an over-statement because we have spoken of the role of these forces in selecting and promoting certain sorts of people. Nevertheless there is something of an irony in suggesting that the way forward involves promoting the use of psychology to de-psychologise human behaviour.

And so to recap…Early in this chapter it became clear that we need a new framework, or paradigm, to guide our thinking about competence and its development and assessment. But study of why the educational system has not in the past operated in a more professional way highlighted a more fundamental problem. This is that the behaviour of both our institutions as wholes and individuals within them is primarily determined by networks of mutually supportive and recursive *external* forces. This observation in turn affects our understanding of competence because it thus emerges that our competence is centrally dependent on understanding and harnessing these forces. More than that, it means that, if we are to claim special expertise in the area of understanding and predicting human behaviour we have to de-animate psychology: to turn it inside out. This is not to say that we should neglect individual psychology any more than the discovery of Newton's laws of motion mean that we should ignore the differences between different species of bird. But what it does mean is that, as professionals, it is incumbent on us to press for study of these forces. If we are to do these things we will need to press, not only for the development of new technico-rational knowledge but, more basically, for a move away from our current enthrallment with positivistic, reductionist, science. If we are to do any of these things we will need to reconsider what it means to be a professional; what professional competence involves.

Summary

In this chapter we have seen that:
1) Much received wisdom relating to the nature, development, and assessment of competence is inadequate[32]. Worse, that much of its application has undesirable, indeed unethical[33], consequences for individuals and society. It follows that it would be unprofessional, indeed unethical, to require participation in "continuing professional development" activities conceived of as requiring enrolment in such things as courses to update participants' technico-rational knowledge.
2) There are endless opportunities to contribute to the evolution of better ways of thinking about, nurturing, and assessing competence. Unfortunately, dealing with the social forces which have, in the past, prevented psychologists doing these things calls for involvement in activities which are currently viewed as outside of psychology, and which many would therefore regard as going beyond their understanding of what it takes to be regarded as a professional psychologist[34]. Nothing could be further from the truth; indeed, recognition of the importance of seeking to understand and find ways of intervening in these networks of forces has major implications for the way psychologists think about the determinants of ehaviou and our understanding of competence in particular.
3) Our own research, including our work on the barriers to effective work in the area, suggests many leads which might be followed up in attempts to move forward.
4) While it *would* be possible to offer off-the-job programmes to nurture the competence of

psychologists, those who set out to provide them would face serious challenges overcoming which would call for exceptional levels of competence and commitment going well beyond what most would regard as the legitimate calls of duty.

5) A more fruitful basis on which to move forward might be to require ehaviour on to set aside time for what Kanter (1985) has usefully designated "parallel ehaviour on activity" and to require psychologists to produce evidence that they have contributed to such activities.

6) What happens in the educational system, and society more generally, is not determined by the values or priorities of parents, pupils, teachers, employers, ministers of education or anyone else but by a network of recursive autopoietic social forces which few have sought to map or understand. Common-sense based interventions in these networks are either negated by the operation of the rest of the system or have counterintuitive, and usually counterproductive, effects.

7) The two key developments are required if we are move forward (i.e., to find ways of tackling the social and "environmental" problems which confront us) are (a) to develop better ways of thinking about, mapping, measuring and harnessing the social forces mentioned above, and (b) to design a new, organic, socio-cybernetic system for the management of society. In this connection, it was suggested that one way of looking at the task would be to see it as pointing the need to devise a new answer to Adam Smith's attempt to formulate arrangements that would lead to a society which would innovate and learn without central direction.

8) For the domain of psychology in general, we need a number of paradigm shifts as basic as those Newton introduced into physics. We need to "de-animate" our explanations of ehaviou and see it as being primarily controlled by networks of invisible forces which can nevertheless be mapped, measured, and harnessed as effectively as Newton's observations made it possible to map, measure, and harness invisible physical forces; although a more appropriate image of the developments that are needed might be provided by attempts to map the interactions occurring in ecological niches.

9) Even more basically, if such developments are to occur, it will be necessary, though our professional development activities, to promote a movement away from a reductionist to what might be called a more ecological image of the scientific process itself.

References

Refs to those not marked with # can be deleted if reference to them not reinstated in main article.
Then delete all # symbols.

#Adams, E. A., Robbins, D., & Stephenson, J. (1981). *Validity and Validation in Higher Education. Research Papers 1-4 and Summary Report*. London: North East London Polytechnic, School of Independent Studies.

#Adams, E., & Burgess, T. (1989). *Teachers' Own Records*. Windsor, England: NFER-Nelson.

Almond, G. A., & Verba, S. (1963). *The Civic Culture*. New Jersey: Princeton University Press.

#Anderson, A., Douglas, K., Holmes, B., Lawton, G., Walker, G., & Webb, J. (Eds.) (2001). Judgement day: There are only angels and devils. *New Scientist*, Global Environment Supplement, April 28.

#Andersson, B-E. (2001a). *Blow up the school!* Paper presented at the NFPF conference in Stockholm, 15-17 March.

#Andersson, B-E. (2001b). *School is good for many, but bad for too many. Voices from Students about their school situation*. Mimeographed paper. Stockholm: Institute of Education, Department of Child and Youth Studies.

#Andersson, B-E., & Strander, K. (1999). *Perceptions of School and Future Adjustment to Life. A Longitudinal Study Between the Ages of 18 and 25*. Stockholm, Sweden: Stockholm Institute of Education, Box 47 308, S-100 74.

#APA Task force on Statistical Inference. (1999). See: L. Wilkinson and Task Force on Statistical Inference. (1999). Statistical methods in psychology journals: Guidelines and explanations. *American Psychologist, 54,* 594-604.

#Association of Graduate Careers Advisory Services. (1992). *What Do Graduates Do?* Cambridge: Hobson's Publishing.

#Bachman, J. G., O'Malley, P. M., & Johnston, J. (1978). *Adolescence to Adulthood: Change and Stability in the Lives of Young Men*. Ann Arbor, MI: Institute for Social Research.

#Becher, T. (2001). The incapable professional. In J. Raven & J. Stephenson (Eds.), *Competence in the Learning Society*. New York: Peter Lang.

#Berg, I. (1973). *Education and Jobs: The Great Training Robbery*. London: Penguin Books.

#Bill, J. M., Trew, C. J., & Wilson, J. A. (1974). *Early Leaving in Northern Ireland*. Belfast: Northern Ireland Council for Educational Research.

#Bloom, B. S. (Ed.). (1985). *Developing Talent in Young People*. New York: Ballantine Books.

#Bookchin, M. (2005). *The Ecology of Freedom: The Emergence and Dissolution of Hierarchy*. Oakland, CA: AK Press.

#Burns, A., Homel, R., & Goodnow, J. (1984). Conditions of life and parental values. *Australian Journal of Psychology, 36*, 219-237.

#Buckingham, M., & Clifton, D. O. (2005). *Now, Discover Your Strengths: How to Develop Your Talents and Those of the People You Manage*. Winchester, UK: Pocket Books.

Bussis, A. M. (1982). Burn it at the casket: Research, reading instruction, and children's learning of the first R. *Phi Delta Kappan*, December, 237-241.

#Chan, J. (1981). Correlates of parent-child interaction and certain psychological variables among adolescents in Hong Kong. In J. L. M. Binnie-Dawson (Ed.), *Perspectives in Asian Cross-Cultural Psychology*. Lisle, Netherlands: Swets and Zeitlinger.

#Coleman, J. S., Campbell, E. Q., Hobson, C. J., McPartland, J., Hood, A. M., Weinfeld, L. D., & York, R. L. (1966). *Equality of Educational Opportunity*. Washington, DC: U.S. Government Printing Office.

#Csikszentmihalyi, M., & LeFevre, J. (1989). Optimal experience in work and leisure. *Journal of Personal Social Psychology, 56*, 815-822.

#Cunningham, L. (2001). Beyond competence through parallel organisation activity: Applying the Principles of Rosabeth Moss Kanter's concept of parallel organisations to learning organisations and the learning society (Chapter 2). In J. Raven & J. Stephenson (Eds.), *Competence in the Learning Society*. New York: Peter Lang.

#Day, P., & Klein, R. (1987). *Accountabilities: Five Public Services*. London: Tavistock Publications.

#De Landsheere, V. (1977). On defining educational objectives. *Evaluation in Education, 1(2)*, 73-190. Oxford: Pergamon Press.

#Deming, W. E. (1980). Improvement of quality and productivity through action by management. *National Productivity Review, 1*, Winter, 12-22.

#Department of Education and Science (1989). *National Curriculum: From Policy to Practice*. London: HMSO.

#Dewey, J. (1899). *The School and Society*. Chicago: University of Chicago Press.

#Dockrell, W. B. (2001). The problems posed for the assessment of competence by the espoused goals of higher education. In J. Raven, & J. Stephenson (Eds.), *Competence in the Learning Society*. New York: Peter Lang.

Donaldson, M. (1978). *Children's Minds*. London: Fontana/Collins.

#Donnison, D. (1972). Research for policy. *Minerva, X*, 519-37.

Eraut, M. (1994). *Developing Professional Knowledge and Competence*. London, England: The Falmer Press.

#Erdal, D. (2008). *Local Heroes - How Loch Fyne Oysters Embraced Employee Ownership and Business Success*, London: Viking

Feuerstein, R. (1980). *Instrumental Enrichment*. Baltimore: University Park Press.

#Fischer, G. H., & Seliger, E. (1997). Multidimensional linear logistic models for change. In: W. J. van der Linden & R. K. Hambleton, *Handbook of modern item response theory* (pp. 323–346). New York: Springer.

#Flanagan, J. C. (1978). *Perspectives on Improving Education from a Study of 10,000 30-Year-Olds*. New York: Praeger Publishers.

#Flanagan, J. C., & Burns, R. K. (1955). The employee performance record. *Harvard Business Review, 33*, 95-102.

#Flanagan, J. C., & Russ-Eft, D. (1975). *An Empirical Study to Aid in Formulating Educational Goals*. Palo Alto, CA: American Institutes for Research.

#Flynn, J. R. (1991). *Asian Americans: Achievement Beyond IQ*. Hillside, NJ: Lawrence Erlbaum Associates.

#Flynn, J. R. (2000). *How to Defend Humane Ideals*. Nebraska: University of Nebraska Press.

#Flynn, J. (2008). Asian Americans: Achievement well beyond IQ. In J. Raven & J. Raven (Eds.) *Uses and Abuses of Intelligence: Studies Advancing Spearman and Raven's Quest for Non-Arbitrary Metrics*. Unionville, New York: Royal Fireworks Press; Edinburgh, Scotland: Competency Motivation Project; Budapest, Hungary: EDGE 2000; Cluj Napoca, Romania: Romanian Psychological Testing Services SRL. (Chapter 18, pp. 415-430).

#Forrester, J. W. (1971). *World Dynamics*. Waltham MA: Pegasus Communications. (Second edition, 1973, has an added chapter on physical vs. social limits.)

#Forrester, J. W. (1971/1995). *Counterintuitive Behavior of Social Systems.* Original text appeared in the January, 1971, issue of the *Technology Review* published by the Alumni Association of the Massachusetts Institute of Technology. All figures are taken from *World Dynamics* by Jay W. Forrester, Pegasus Communications, Waltham MA. http://sysdyn.clexchange.org/sdep/Roadmaps/RM1/D-4468-2.pdf

#Fraley, A. (1981). *Schooling and Innovation: The Rhetoric and the Reality*. New York: Tyler Gibson.

#Francis, H. (1982). Language teaching research and its effect on teachers in early education. In A. Davies (Ed.), *Language and Learning in Home and School*. London: SCRC/Heinemann.

#Galton, M., & Simon, B. (1980). *Progress and Performance in the Primary Classroom*. London: Routledge and Kegan Paul.

#Galton, M., Simon, B., & Croll, P. (1980). *Inside the Primary Classroom*. London: Routledge and Kegan Paul.

#Gardner, H. (1987). Developing the spectrum of human intelligence. *Harvard Education Review, 57*, 187-193.

#Gardner, H., & Hatch, T. C. (1989). Multiple intelligences go to school. *Educational Researcher, 18(8)*, 4-10.

#Goodlad, J. (1983). *A Place Called School*. New York: McGraw Hill.

#Gottfredson, L. S. (Ed.) (1997). Intelligence and social policy. *Intelligence, Whole Special Issue, 24*, 1-320.

#Gow, L., & McPherson, A. (Eds.). (1980). *Tell Them From Me: Scottish School Leavers Write About School and Life Afterwards*. Aberdeen: University Press.

#Graham, M. A., Raven, J., & Smith, P. C. (1987). *Identification of high-level competence: Cross-cultural analysis between British, American, Asian and Polynesian labourers*. Unpublished manuscript: BYU Hawaii Campus, Dept. Organizational Behavior.

#Gray, J. et al. (1983). *Reconstructions of Secondary Education: Theory, Myth and Practice Since the War*. London: Routledge and Kegan Paul.

#Hamilton, D., Jenkins, D., King, C., MacDonald, B., & Parlett, M. (Eds.). (1977). Beyond the Numbers Game. London: MacMillan Education.

#Hattie, J. A. C. (2009). *Visible Learning: A synthesis of over 800 meta-analyses relating to achievement*. London, England: Routledge; Taylor & Francis.

#Hayek, F. A. (1948). *Individualism and Economic Order*. Chicago: University of Chicago Press.

#Hess, R. D., & Shipman, V. C. (1965). Early experience and the socialisation of cognitive modes in children. *Child Development, 36*, 869-886.

#Hewison, J., & Tizard, J. (1980). Parental involvement and reading attainment. *British Journal of Educational Psychology, 50*, 209-215.

#HMI (Scotland). (1980). *Learning and Teaching in Primary 4 and Primary 7*. Edinburgh: HMSO.

#HMI. (1978). *Primary Education in England: A Survey by H.M. Inspectors of Schools*. London: Department of Education and Science, HMSO.

#Hogan, R. (1990). Unmasking incompetent managers. *Insight*, May 21, 42-44.

#House, E. R. (1991). Realism in research. *Educational Researcher, 20*, 2-9.

#Huff, S., Lake, D., & Schaalman, M. L. (1982). *Principal Differences: Excellence in School Leadership and Management*. Boston: McBer and Co.

#Hughes, S. J. (1998). *Developmental Effects of Participation in a Large Group Awareness Training*. PhD Thesis, University of Minnesota.

#Ilott , I. (2001). Incompetence: An unspoken consensus (Chapter 5). In J. Raven & J. Stephenson (Eds.), *Competence in the Learning Society*. New York: Peter Lang.

#Ilott, I., & Murphy, R. (1999). *Success and Failure in Professional Education: Assessing the Evidence*. London: Whurr Publishers.

Inkeles, A., & Smith, D .H. (1974). *Becoming Modern*. Cambridge, MA: Harvard University Press.

#Jackson, P. W. (1968). *Life in Classrooms*. New York: Holt Rhinehart and Winston.

#Jackson, P. W. (1986). *The Practice of Teaching*. New York: Teachers College Press.

#Jacob, P. E. (1956). *Changing Values in College*. New York: Harper Bros.

#Jencks, C., Smith, M., Acland, H., Bane, M. J., Cohen, D., Gintis, H., Heyns, B., & Michelson, S. (1973). *Inequality: A Reassessment of the Effect of Family and Schooling in America*. New York: Basic Books; London, England: Penguin Books.

#Jensen, A. R. (1998). *The **g** Factor: The Science of Mental Ability*. Westport, CN: Praeger.

#Johnson, H. T., & Broms, A. (2000). *Profit Beyond Measure*. New York, NY. Free Press.

Johnston, L. D. (1973). *The American High School: Its Social System and Effects*. Ann Arbor, MI: Institute for Social Research.

#Johnston, L. D., & Bachman, J. G. (1976). Educational institutions (290–315). In J. F. Adams (Ed.), *Understanding Adolescence* (IIIrd Edition). Boston: Allyn and Bacon.

#Joint Committee on Standards for Educational Evaluation (1981). *Standards for Evaluations of Educational Programs, Projects and Materials*. New York: McGraw Hill Book Co.

#Kanter, R. M. (1985). *The Change Masters: Corporate Entrepreneurs at Work*. Hemel Hempstead: Unwin Paperbacks.

#Kazdin, A. E. (2006). Arbitrary metrics: Implications for identifying evidence-based treatments. *American Psychologist, 61,* 42-49.

#Kilpatrick, W. H. (1918). The project method. *Teachers College Record, 19*, 319-35.

#Kilpatrick, W. H. (1926/1972). *Foundations of Method*. New York: MacMillan; (1972: Arno).

#Klemp, G. O., Huff, S. M., & Gentile, J. D. G. (1980). *The Guardians of Campus Change: A Study of Leadership in Non Traditional College Programs*. Boston: McBer and Co.

#Klemp, G. O., Munger, M. T., & Spencer, L. M. (1977). *An Analysis of Leadership and Management Competencies of Commissioned and Non-Commissioned Naval Officers in the Pacific and Atlantic Fleets*. Boston: McBer.

#Kohn, M. L. (1969/77). *Class and Conformity: A Study in Values* (Second Edition). Chicago IL: Chicago University Press. (1st edition: Dorsey Press.)

#Kohn, M. L., & Schooler, C. (1982). Job conditions and personality: A longitudinal assessment of their reciprocal effects. *American Journal of Sociology, 87*, 1257-86.

#Kohn, M. L., Slomczynski, K. M., & Schoenbach, C. (1986). Social stratification and the transmission of values in the family: A cross-national assessment. *Sociological Forum, 1*.

#Krechevsky, M., & Gardner, H. (1990). Multiple Intelligences, multiple chances. In D. Inbar (Ed.), *Second Chance in Education: An Interdisciplinary and International Perspective* (pp. 69-88). London: Falmer Press.

#Lane, R. E. (1991). *The Market Experience*. New York: Cambridge University Press.

#Lees, S. (1996). Strategic Human Resource Management in Transition Economies. *Proceedings of Conference: Human Resource Management: Strategy and Practice*. Alma Atat Management School, Alma Atat, Khazaksthan.

#Lester, S. (2001). Assessing the self-managing learner: A contradiction in terms (Chapter 26)? In J. Raven & J. Stephenson (Eds.), *Competence in the Learning Society*. New York: Peter Lang.

#MacBeath, J., Mearns, D., Thomson, B., & How, S. (1981). *Social Education: The Scottish Approach*. Glasgow: Jordanhill College of Education.

MacKinnon, D. W. (1962). The nature and nurture of creative talent. *American Psychologist, 17*, 484-494.

#McClelland, D. C. (1961). *The Achieving Society*. New York: Van Nostrand.

McClelland, D. C. (1982). *Education for Values*. New York: Irvington.

#McClelland, D. C., Atkinson, J. W., Clark, R. A., & Lowell, E. L. (1958). A scoring manual for the achievement motive; R. W. Heynes, J. Veroff, & J. W. Atkinson, A scoring manual for the affiliation motive; J. Veroff, A scoring manual for the power motive. Respectively, Chapters 12, 13 and 14 in J. W. Atkinson (Ed.), *Motives in Fantasy, Action and Society*. New York: Van Nostrand.

#McGillicuddy-DeLisi, A. V. (1982). The relationship between parents' beliefs about development and family constellation, socio-economic status and parents' teaching strategies. In L. M. Laosa and I. E. Sigel (Eds.), *Families as Learning Environments for Children* (261-299). New York: Plenum.

#Marks, N., Simms, A., Thompson, S., & Abdallah, S. (2006). *The (Un)happy Planet Index: An Index of Human Well-being and Environmental Impact*. London: New Economics Foundation. Downloadable from www.neweconomics.org and www.happyplanetindex.org

#Meadows, D. H., Meadows, D. L., & Behrens, W. W. (1972). *The Limits to growth: A report for the Club of Rome's Project on the Predicament of Mankind*. London: Macmillan.

#Meadows, D. H., Meadows, D. L., & Randers, J. (2008). www.Vensim\models\sample\WRLD3-O03\World3_03_Scenarios.wmfView

#Meadows, D. H., Meadows, D., & Randers, J. (2004). *The Limits to Growth: The 30-Year Update*. London: Earthscan Ltd.

#Mentkowski, M. & Associates (2000). *Learning that Lasts. Integrating Learning, Development, and Performance in College and Beyond*. San Francisco. Jossey-Bass.

#Messick, S. (1989). Meaning and values in test validation: The science and ethics of assessment. *Educational Researcher, 18(2)*, 5-11.

#Messick, S. (1995). Validity of psychological assessment. *American Psychologist, 50(9)*, 741-749.

#Mill, J. S. (1859/1962). *Representative Government*. London: Dent.

Miller, K. A., Kohn, M. L., & Schooler, C. (1985). Educational self-direction and the cognitive functioning of students. *Social Forces, 63*, 923-944.

#Morgan, G. (1986). *Images of Organization*. Beverly Hills, CA: Sage.

#Morgan, G. (Ed.). (1983). *Beyond Method*. London: Sage.

#Morton-Williams, R., Finch, S., Poll, C., Raven, J., Ritchie, J., & Hobbs, E. (1968). *Schools Council Enquiry One: Young School Leavers*. London: HMSO.

#Munn Report (1977). *The Structure of the Curriculum*. Edinburgh: HMSO.

#National Curriculum Council (1990a). *Curriculum Guidance, 3: The Whole Curriculum*. York: NCC.

#National Curriculum Council (1990b). *Curriculum Guidance, 4: Education for Economic and Industrial Understanding*. York: NCC.

#O'Reilly, D. (2001). Competence and incompetence in an institutional context (Chapter 22). In J. Raven & J. Stephenson (Eds.), *Competence in the Learning Society*. New York: Peter Lang.

#Oskamp, S. (2000). A sustainable future for humanity? *American Psychologist, 55(5)*, 496-508.

#Parker, F. W. (1894/1969). *Talks on Pedagogics*. New York: Arno Press.

#Parlett, M. (1972). Evaluating innovations in teaching. In H. J. Butcher & E. Rudd (Eds.), *Contemporary Problems in Research in Higher Education*. New York: McGraw Hill.

#Parlett, M. (1976). Assessment in its context. *Bulletin of Educational Research: Evaluation and Assessment*, *11*, Summer.

Passow, A. H., Noah, H. J., Eckstein, M. A., & Mallea, J. R. (1976). *An Empirical Study of Twenty-One Educational Systems*. Stockholm: Almqvist and Wiksell.

#Pascarella, E. T., & Terenzini, P. T. (1991). *How College Effects Students*. San Francisco, CA: Jossey-Bass.

Plowden Report. (1966). *Central Advisory Council on Education. Children and Their Primary Schools*, Volumes 1 & 2. London: HMSO.

#Price, P. B., Taylor, C. W., Nelson, D. E., et al. (1971). *Measurement and Predictors of Physician Performance: Two Decades of Intermittently Sustained Research*. Salt Lake City: University of Utah, Department of Psychology.

#Prieler, J. & Raven, J. (2008). Problems in the measurement of change (with particular reference to individual change [gain] scores) and their potential solution using IRT. In J. Raven & J. Raven (Eds.) *Uses and Abuses of Intelligence: Studies Advancing Spearman and Raven's Quest for Non-Arbitrary Metrics*. Unionville, New York: Royal Fireworks Press; Edinburgh, Scotland: Competency Motivation Project; Budapest, Hungary: EDGE 2000; Cluj Napoca, Romania: Romanian Psychological Testing Services SRL. (Chapter 7, pp. 173-210).

#Raven, J. (1977). *Education, Values and Society: The Objectives of Education and the Nature and Development of Competence*. London, U.K.: H.K.Lewis, New York: The Psychological Corporation. (Copies still available from Competency Motivation Project, Edinburgh, Scotland).

#Raven, J. (1980). *Parents, Teachers and Children: An Evaluation of an Educational Home Visiting Programme*. Edinburgh: Scottish Council for Research in Education.

#Raven, J. (1984). Some limitations of the standards. *Evaluation and Program Planning, 7*, 363-370.

#Raven, J. (1984/1997). *Competence in Modern Society: Its Identification, Development and Release*. Unionville, New York: Royal Fireworks Press. www.rfwp.com (First published in 1984 in London, England, by H. K. Lewis.)

#Raven, J. (1987a). Learning to teach in primary schools: Some reflections. *Collected Original Resources in Education, 11*, F3, D07.

#Raven, J. (1987b). Tell them about teacher training. *Collected Original Resources in Education, 11*, F3, F13.

#Raven, J. (1989). Parents, education and schooling. In C. Desforges (Ed.), *British Journal of Educational Psychology, Monograph Series No.4*, Special Issue on Early Childhood Education (47-67).

#Raven, J. (1991). *The Tragic Illusion: Educational Testing*. New York: Trillium Press; Oxford, U.K.: Oxford Psychologists Press.

#Raven, J. (1994). *Managing Education for Effective Schooling: The Most Important Problem Is to Come to Terms with Values*. Unionville, New York: Trillium Press; Edinburgh, Scotland: Competency Motivation Project.

#Raven, J. (1995). *The New Wealth of Nations: A New Enquiry into the Nature and Origins of the Wealth of Nations and the Societal Learning Arrangements Needed for a Sustainable Society*. Unionville, New York: Royal Fireworks Press; Sudbury, Suffolk: Bloomfield Books.

#Raven, J. (2000). Rethinking democracy. *The Good Society* 9(3), 31-37.

#Raven, J. (2001a). Commentary: The pernicious effects of incompetence on society, education, and assessment (Chapter 6). In J. Raven & J. Stephenson (Eds.), *Competence in the Learning Society*. New York: Peter Lang.

Raven, J. (2001b). Facilitating the development of competence (Chapter 18). In J. Raven & J. Stephenson (Eds.), *Competence in the Learning Society*. New York: Peter Lang.

#Raven, J. (2001c). Issues raised by the studies of competence (Chapter 12). In J. Raven & J. Stephenson (Eds.), *Competence in the Learning Society*. New York: Peter Lang.

#Raven, J. (2001d). Learning societies, learning organisations, and learning: Their implications for competence, its development, and its assessment (Chapter 1). In J. Raven & J. Stephenson (Eds.), *Competence in the Learning Society*. New York: Peter Lang.

#Raven, J. (2001e). Some barriers to the introduction of competency-oriented education (Chapter 23). In J. Raven & J. Stephenson (Eds.), *Competence in the Learning Society*. New York: Peter Lang.

#Raven, J. (2001f). The conceptualisation of competence (Chapter 17). In J. Raven & J. Stephenson (Eds.), *Competence in the Learning Society*. New York: Peter Lang.

#Raven, J. (2001g). The assessment of competence (Chapter 28). In J. Raven & J. Stephenson (Eds.), *Competence in the Learning Society*. New York: Peter Lang.

#Raven, J. (2008). Intelligence, engineered invisibility, and the destruction of life on earth. In J. Raven & J. Raven (Eds.) *Uses and Abuses of Intelligence: Studies Advancing Spearman and Raven's Quest for Non-Arbitrary Metrics*. Unionville, New York: Royal Fireworks Press; Edinburgh, Scotland: Competency Motivation Project; Budapest, Hungary: EDGE 2000; Cluj Napoca, Romania: Romanian Psychological Testing Services SRL. (Chapter 19, pp. 431-471). Earlier version available at: WebPsychEmpiricist. http://www.wpe.info/papers_table.html

#Raven, J. (2009a). The emergence of hierarchy, domination and centralisation: Reflections on the work of Murray Bookchin. *Journal for Perspectives of Economic, Political, and Social Integration, 14(1-2),* 11-75. Also available at: http://www.eyeonsociety.co.uk/resources/Bookchin.pdf

#Raven, J. (2009b) *Crisis? What Crisis?* http://eyeonsociety.co.uk/resources/cwc.pdf

#Raven, J. (2010a). Advancing and Defeating the PEGS Agenda: Socio-Cybernetics and Murray Bookchin. *The Good Society, 19,* No. 2. 79-88. Earlier & fuller version available at http://eyeonsociety.co.uk/resources/GS09.pdf

#Raven, J., & Dolphin, T. (1978). *The Consequences of Behaving: The Ability of Irish Organisations to Tap Know-How, Initiative, Leadership and Goodwill*. Edinburgh: Competency Motivation Project.

#Raven, J., & Gallon, L. (2010). Conceptualising, Mapping, and Measuring Social Forces. *Journal of Sociocybernetics.* **8,** 73-110. http://www.unizar.es/sociocybernetics/Journal/journal_1_2_2010_1.pdf Earlier version also available at http://eyeonsociety.co.uk/resources/scio.pdf

#Raven, J., & Litton, F. (1982). Aspects of civics education in Ireland. *Collected Original Resources in Education, 6(2)*, F4E7.

#Raven, J., & Navrotsky, V. (2001). The Development and Use of Maps of Socio-Cybernetic Systems to Improve Educational and Social Policy. *Journal of Mental Changes*, **7**, 19-60. Many important Figures were omitted from this version, so it is better to use http://www.eyeonsociety.co.uk/resources/RVNAVSC%20landscape.pdf and the linked figures.

#Raven, J., & Whelan, C. T. (1976). Irish adults' perceptions of their civic institutions. In J. Raven, C. T. Whelan, P. A. Pfretzschner, & D. M. Borock, *Political Culture in Ireland*. Dublin: Institute of Public Administration.

#Raven, J., Hannon, B., Handy, R., Benson, C., & Henry, E. A. (1975a). *A Survey of Attitudes of Post Primary Teachers and Pupils, Volume 1: Teachers' Perceptions of Educational Objectives and Examinations*. Dublin: Irish Association for Curriculum Development.

#Raven, J., Hannon, B., Handy, R., Benson, C., & Henry, E. A. (1975b). *A Survey of Attitudes of Post Primary Teachers and Pupils, Volume 2: Pupils' Perceptions of Educational Objectives and their Reactions to School and School Subjects*. Dublin: Irish Association for Curriculum Development.

#Raven, J., Johnstone, J., & Varley, T. (1985*).* Opening the Primary Classroom. Edinburgh: Scottish Council for Research in Education.

#Ree, M. J., Earles, J. A., & Teachout, M. S. (1994). Predicting job performance: Not much more than *g*. *Journal of Applied Psychology, 79*, 518-524.

#Ridley, M. (2010). *The Rational Optimist: How Prosperity Evolves*. London: Fourth Estate.

#Robinson, D. W. (1983). *Patriotism and Economic Control: The Censure of Harold Rugg*. D.Ed. Dissertation, Rutgers University, New Jersey. Also available in University Microfilms International, Ann Arbor, Michigan (1984).

#Roizen, J., & Jepson, M. (1985). *Degrees for Jobs*. Guildford: SHRE and NFER-Nelson.

Rugg, H. (1926). *National Society for the Study of Education: 26th Yearbook*. Bloomington, IL: Public School Publishing Co.

#Rugg, H. O., & Krueger, L. (1925-1940). *Man and his Changing Society: The Rugg Social Science Series* (nine Volumes). Boston: Ginn & Co.

#Schmidt, F. L., & Hunter, J. E. (1998). The validity and utility of selection methods in personnel psychology: Practical and theoretical implications of 85 years of research findings. *Psychological Bulletin, 124(2)*, 262-274.Schneider, C., Klemp, G. O., & Kastendiek, S. (1981). *The Balancing Act: Competencies of Effective Teachers and Mentors in Degree Programs for Adults*. Boston: McBer and Co.

#Schön, D. (1971/73). *Beyond the Stable State*. London: Penguin.

#Schön, D. (1983). *The Reflective Practitioner*. New York: Basic Books.

#Schön, D. (1987). *Educating the Reflective Practitioner*. San Francisco, CA: Jossey-Bass.

#Schön, D. (2001). The crisis of professional knowledge and the pursuit of an epistemology of practice (Chapter 13). In J. Raven & J. Stephenson (Eds.), *Competence in the Learning Society*. New York: Peter Lang.

#Seddon, J. (2008). *Systems Thinking in the Public Sector: The Failure of the Reform Regime … and a Manifesto for a Better Way*. Axminster, UK: Triarchy Press.

#Semler, R. (2001). *Maverick!: The Success Story Behind the World's Most Unusual Workplace*. London: Random House.

#Shiva, V. (1998). *Biopiracy: The Plunder of Nature and Knowledge*. London: Green Books.

#Sigel, I. E. (1986). Early social experience and the development of representational competence. In W. Fowler (Ed.), Early Experience and the Development of Competence. *New Directions for Child Development, No.32*. San Francisco, CA: Jossey-Bass.

#Sigel, I. E. (1986). Reflections on the belief-behavior connection: Lessons learned from a research program on parental belief systems and teaching strategies. In R. D. Ashmore and D. M. Brodzinsky (Eds.), *Thinking about the Family: Views of Parents and Children*. Hillsdale, NJ: Erlbaum.

#Sigel, I. E. (Ed.). (1985). *Parent Belief Systems: The Psychological Consequences for Children*. Hillside, NJ: Erlbaum.

#Sigel, I. E., & McGillicuddy-DeLisi, A. V. (1984). Parents as teachers of their children: A distancing behavior model. In A. D. Pellegrini and T. D. Yawkey (Eds.), *The Development of Oral and Written Language in Social Contexts*. Norwood, NJ: Ablex.

#Smith, A. (1776/1981). *The Wealth of Nations*. Penguin Books: Harmondsworth, Mddx.

Sneddon Report (1978). *Learning to Teach*. Edinburgh: HMSO, Scottish Education Department.

#Spearman, C. (1926). *Some Issues in the Theory of g (Including the Law of Diminishing Returns)*. Address to the British Association Section J – Psychology, Southampton, England, 1925. London: Psychological Laboratory, University College: Collected Papers.

#Spencer, L. M., & Spencer, S. M. (1993). *Competence at Work*. New York: Wiley.

#Stallings, J., & Kaskowitz, D. (1974). *Follow Through Classroom Observation Evaluation 1972–1973*. Menlo Park, CA: Stanford Research Institute. Report URU-7370.#Steiner, D. (1999). Searching for educational coherence in a democratic state. In S. L. Elkin & K. E. Soltan (Eds.), *Citizen Competence and Democratic Institutions*. University Park, PA: Pennsylvania State University Press.

#Stephenson, J. (2001). Inputs and outcomes: The experience of independent study at NELP (Chapter 21). In J. Raven & J. Stephenson (Eds.), *Competence in the Learning Society*. New York: Peter Lang.

#Stern, P. C. (2000). Psychology and the science of human-environment interactions. *American Psychologist, 55(5)*, 523-530.

#Taylor, C. W., & Barron, F. (Eds.). (1963). *Scientific Creativity: Its Recognition and Development*. New York: Wiley.

#Tizard, B., & Hughes, M. (1984). *Young Children Learning: Talking and Thinking at Home and School*. London: Fontana.

#Tough, J. (1973). *Focus on Meaning: Talking with Some Purpose to Young Children*. London: Allen and Unwin.

#Tough, J. (1976). *Listening to Children Talking*. London: Ward Lock.

#Tough, J. (1977). *Talking and Learning*. London: Ward Lock.

#Tribe, D. (2001). Professional capability - Requirements and accreditation in the legal profession (Chapter 11). In J. Raven & J. Stephenson (Eds.), *Competence in the Learning Society*. New York: Peter Lang.

United States Department of Education. (1981). *The Condition of Education*. Washington, DC: National Center for Educational Statistics.

#US Government Printing Office. (2001). *No Child Left Behind*. Public Law, 107 – 110.

#Vygotsky, L. S. (1978). Mind in society: The development of higher psychological processes. In M. Cole, et al. (Eds.), … Cambridge, MA: Harvard University Press.

#Vygotsky, L. S. (1981). The genesis of higher mental function. In J. V. Wertsch (Ed.), *The Concept of Activity in Society Psychology*. Annank, NH: Sharpe.

#Wackernagel, M., & Rees, W. E. (1996). *Our Ecological Footprint: Reducing Human Impact on the Earth*. Philadelphia: New Society Publishers.

#Walker, D. A. (1976). *The IEA Six Subject Survey: An Empirical Study of Education in Twenty One Countries*. New York: John Wiley.

#Weaver, T. (1994). Knowledge alone gets you nowhere. *Capability, 1*, 1–6.

#Winter, D. G., McClelland, D. C., & Stewart, A. J. (1981). *A New Case for the Liberal Arts*. San Francisco: Josey-Bass.

Appendix A

Mapping and Summing Physical Forces

It has emerged that some readers are not as familiar with the procedures involved in mapping, measuring, and summating physical forces as had been assumed. This Appendix has therefore been prepared in the hope of providing some assistance.

The most basic illustration we can think of is predicting in which direction, and with what force, a group made up of two boys pulling on ropes attached to a goat's collar will move – see Figure A1.
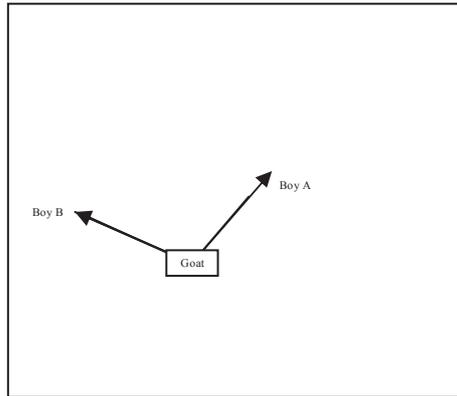
Figure A1: Two Boys and a Goat.

To progress the analysis, both the direction and strengths the three forces can be represented as in Figure A2, where the lengths of the lines (vectors) shows how strongly each is pulling in the direction shown.
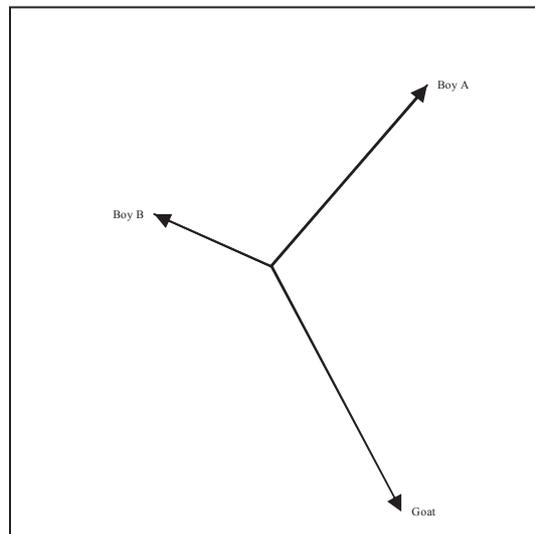
Figure A2: The Struggle Between the Boys
and the Goat Expressed in Vectors.

The direction and strength of the outcome of this struggle can be calculated by dropping perpendiculars onto any two dimensions (or orthogonal axes) inserted into Figure A2 at random (Figure A3). Summing these intersects, or coordinates, (i.e. $A_x + B_x + G_x$ and $A_y + B_y + G_y$) (treating coordinates to the left of the origin on the X axis and below the origin on the Y axis as negative) gives the coordinates (R_x and R_y) of the final vector resulting from the struggle (**R** in Figure A3). This shows the strength and direction of the outcome. (In this case, the goat wins!)
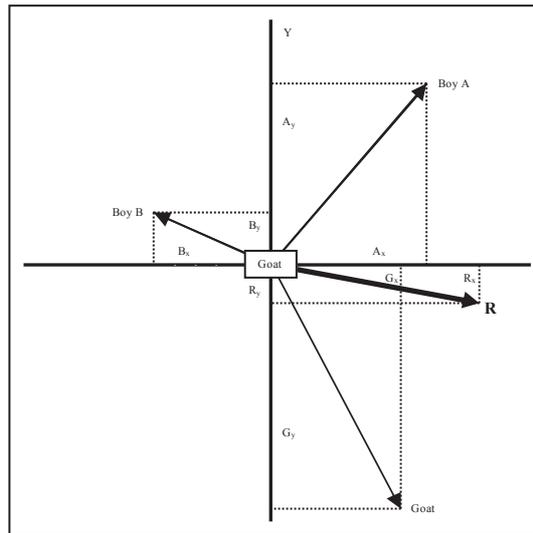
Figure A3: Calculating the Outcome of the Struggle with the Goat.

Mapping and summating the forces acting on a sailing boat is more complicated, but the process is the same. Even an oversimplified diagram has to include the force of the wind on the sails, the resulting thrust on the mast and, via the ropes attached to the outer corner of the sail, toward the stern of the boat, the effect of the rudder, and, most importantly from the point of view of our discussion here, the force of the sea on the keel (see Figure A4).
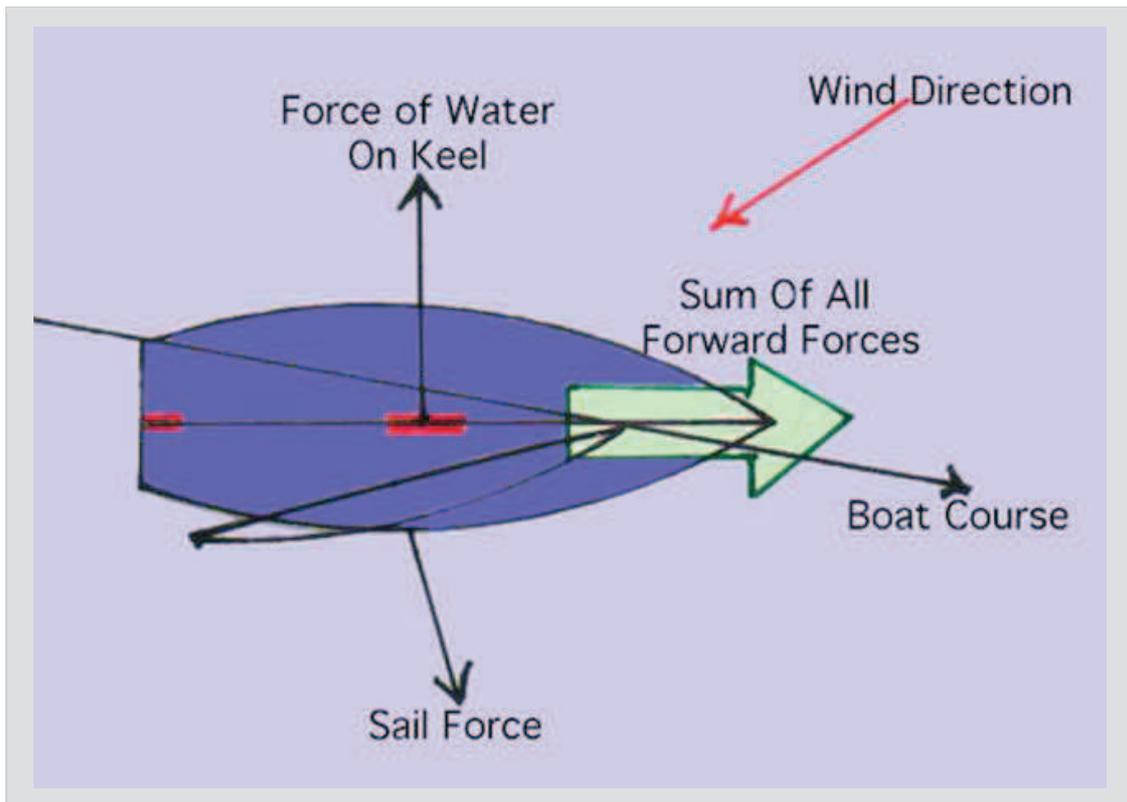
Figure A4: Forces Acting on a Sailing Boat.

Why is the keel so important to us?

Prior to Newton, not only had the concept of "force" – so obvious to us now – not been articulated, the movement of sailing boats was to a much greater extent than later in the lap of the Gods. Boats could only sail *with* the wind. If their captains wanted to reach a destination upwind, they had to hove-to and pray for a favourable wind.

The first thing Newton did was show that what he hypothesised to be a "force" in this invisible wind could be *measured*. He did this by first jumping with the wind and measuring how far he could jump and then jumping into the wind and making a similar measurement. The difference between the two gave him the strength of the wind.

Then, among Newton's of "laws of motion", is the idea that "to every force there is an equal and opposite reaction".

Now. Where is the equal and opposite reaction to the force of the wind on the sailing boat?

In the sea?

OK. If so, how can it be harnessed?

Answer "By adding a keel to the sailing boat". And that is precisely what is shown in Figure A4. Harnessing the invisible force in the sea is key to getting the boat to sail *into* the wind.

It is important to note that *none* of the above is "common sense" … indeed, from the common sense perspective that preceded Newton, it is just madness … I mean, its just crazy to suggest that there is a force in the sea! The necessary developments could not have been introduced unless Newton had articulated the concept of force and shown that it was measurable and behaved in predictable – law-like – ways.

Newton went on to do something else which is even closer to what we are trying to do here – namely to map the forces determining the orbits of the planets and compute their cumulative strengths.

First, he needed the concept of "gravity". Then he had again to demonstrate that it could be measured. And then that the results were consistent. And, very surprisingly, bags of coal and desert spoons if dropped from the top of a tower, reached the ground at the same time[35].

And then he had to find a way of integrating all the interacting pulls of every planet on every other.

To perform that task he had to invent calculus.

We do not have to do that.

But my thesis *is* that we *do* have to embrace an exactly parallel series of problems if we wish to develop better ways of thinking about the nature, measurement, and harnessing of social forces.

Problems in the Measurement of Change
Arising from the Fact that
Equal Raw Score Differences Among High and Low Scoring Individuals
Do not Imply Equal Differences in Latent Ability.

Figure B1 illustrates the problem for people of high ability and Figure B2 for those of low ability.

If we employ a test having the Test Characteristic Curve shown on the left in Figure B1, the mean scores of the high ability group increase from A at the pretest (i.e. before being involved in some educational enrichment or health care programme) to B at posttest (i.e. after having been involved in the programme). This is a relatively small increase. But if we use the more difficult test shown on the right, the same increase in score on the latent trait of the high ability group shows up as a *huge* increase in raw score, moving from X to Y.
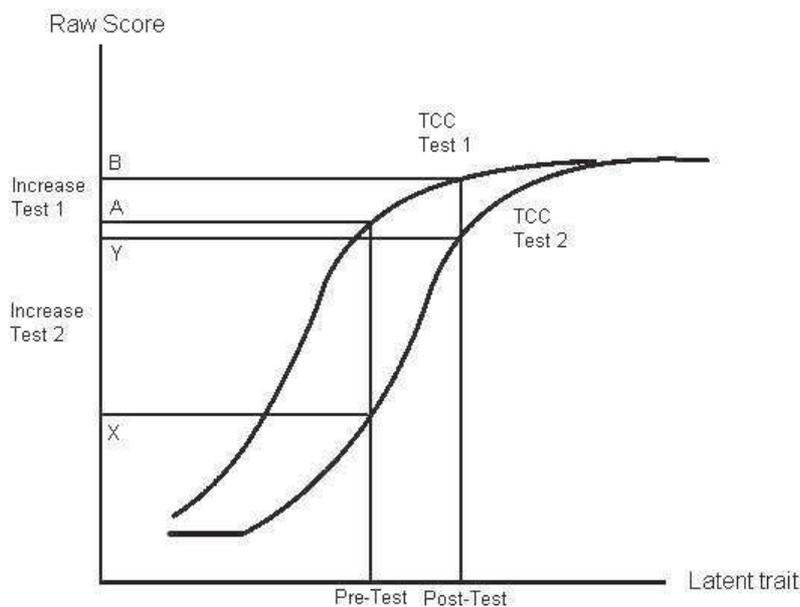
High ability individuals only
Reproduced from Prieler and Raven (2008)

Figure B1: Changes in Raw Scores on "Easy" and "Difficult" Tests for Identical Changes in Latent Ability.

As can be seen from Figure B2, exactly the opposite effect occurs at the other end of the scale. The apparent increase in score from pretest to posttest is huge on Test 1 and trivial on Test 2.

Putting the two cases together, it is obvious that, if the researcher employs Test 1 to assess the impact of the course, the relative gains of the low ability group are huge while those of the high ability group are trivial. On the other hand, if the researcher employs Test 2, exactly the opposite findings emerge.

The general, and vitally important, conclusion which emerges from these examples is that the apparent magnitude of any real increase in latent ability arising from a developmental experience, health care treatment, or natural change over time depends (a) the general

difficulty level of the test relative to the ability tested, (b) the shape of the Test Characteristic Curve, and (c) the sector of the curve over which change was measured.
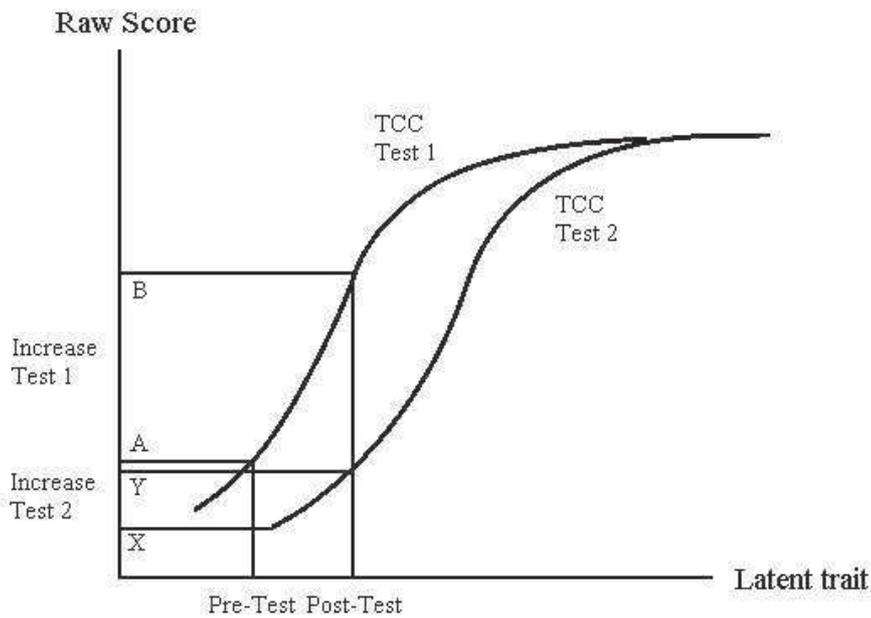
Low ability individuals only
Reproduced from Prieler and Raven (2008)

Figure B2: Changes in Raw Scores on "Easy" and "Difficult" Tests for Identical Changes in Latent Ability.

This makes it virtually impossible, without employing the techniques summarized in Prieler & Raven (2008), to make any meaningful statement about the *relative* magnitude of gains or losses of high, medium, and low ability groups.

End Notes

1   Morton Williams et al., 1968; Goodlad, 1983; Johnston and Bachman, 1976; Flanagan and Russ-Eft, 1975; Flanagan, 1978; De Landsheere, 1977; Bill et al., 1974; MacBeath et al., 1981; Raven, 1977: Raven, Hannon et al., 1975a&b; Andersson, 2001b

2   73% of our adolescent pupils said that it was very important for schools to help them to do as well as possible in external examinations, but only 27% that it was important to learn about aspects of subjects not required for examination purposes. These figures compare with 83% who said it was very important for schools to help them "Develop the confidence and initiative required to introduce change". Their answers to other questions confirm that they correctly recognise that mastering the content they spend so much time studying and on which they are tested is largely a waste of time. I say "correctly" because the fact is that such knowledge has a half-life of a year. People forget 50% in one year, 75% in two years, 87.5% in three years and so on. It is also out of date when it is taught and fails to relate to the problems with which they will have to engage later in life.

3   See especially Passow et al. (1976) or Munn (1977) for reviews. However, it is significant that such goals have not been stressed in *The Condition of Education* (United States Department of Education, 1981), *No Child Left Behind* (US Govt printing office, 2001) or the UK *National Curriculum* (Department of Education and Science, 1989; National Curriculum Council 1990a&b).

4   Later known as the Training Agency.

5   Goodlad, 1983; HMI, 1990; Galton et al.,1980, ; Raven et al., 1985; Johnston, 1973; Johnston & Bachman, 1976; Fraley, 1981

6   Office for Standards in Education, Children's Services and Skills.

[7]   Although it would distract from the flow of this chapter to discuss it here, Lees' diagram shows that competent human resource management (actually a crucial competence to be possessed by *all* managers) which is usually taken to mean a focus on selecting and developing the talents of individuals within organisations actually requires understanding of, and intervention in, the culture and structure of the organisation and in the external political, legal, economic, and socio-cultural system.

8   In 1985, Kanter, very usefully, introduced the term "parallel organisation activity" to describe these activities. The term is important because it draws attention to the fact that that these activities do not *replace* the normal day to day hierarchical and defined-task-oriented activities of the organisation. Rather, they go on *alongside* – in parallel with – them. However time and resources are specifically set aside for them and all members of the organisation are involved. During this time, fluid, non-hierarchical, groupings form around emergent and previously half-noticed "problems". The members of these groups contribute in many different ways and a deliberate effort is made to recognise these diverse contributions. And staff are encouraged to work with other people engaging with similar problems both within the organisation and outside. Such collaboration generates new ideas and establishes and maintains a network of contacts to provide help and support when difficulties arise.

9   Nevertheless, because of the significance it will assume later, it should not escape notice that qualification inflation create thousands of jobs for "educators" and all those connected with the "educational" system (administrators, test-constructors, markers, publishers, and so on).

10   McClelland, 1961; McClelland and Winter, 1969.

11   McClelland, 1961; Graham, Raven, and Smith, 1987.

12   It is actually truer to say that the economic and social consequences of alternative systems have been studied - see Almond and Verba (1963); Inkeles and Smith (1974); Flanagan and Russ-Eft (1975). Particular attention may be drawn to the fact that the Japanese miracle was built on social, rather than technological, innovation. Their two most important inventions have been their information-technology-based mechanism for debating the future and gaining consensus on how a desirable future is to be created, and their capacity to analyse and find ways of penetrating every known type of political economy.

13   Morton-Williams et al., 1968; Raven, 1977; De Landsheere, 1977; Bill et al., 1974; HMI (Scotland) 1980; MacBeath et al., 1981; Gray et al., 1983; Gow and McPherson (Eds.), 1980; Andersson, 2001a, b.

14   It will, of course, be objected that things have changed since these data were collected. But Andersson's (2001a,b) data hardly support it. In broad terms, one third liked school, one third just about tolerated it, and one third found it a thoroughly destructive experience. Throughout my career as a researcher I have heard statements to the effect that "Yes, it used to be like that, but, in the last couple of years, things have changed". Whenever these beliefs have been checked they have turned

out to lack foundation. More to the point, time after time, as the truth has dawned, one tranch of trumpeted reforms has been replaced by another equally lacking in an understanding of the kinds of problems discussed in this chapter - and thus unlikely to be successful.

15 HMI, 1978; Galton, M., Simon, B., & Croll, P., 1980; ; Goodlad, 1983; Johnson & Bachman 1976; Flanagan, 1978; Raven et al., 1985

16 It is important to note that, even if the teacher's objective had been to enhance the pupils' knowledge, documenting that knowledge would have posed insuperable problems for evaluators steeped in classical measurement theory. This stems from the fact that the knowledge would, on the one hand, have consisted of unique combinations of up-to-date specialist knowledge (i.e. it would have largely been idiosyncratic) and, on the other hand, would have been comprised of unverbalised, and often unconscious, knowledge of ways of doing things (i.e. it would mainly have consisted of *tacit* knowledge).

Because of its significance when thinking about assessment issues, and the assessment of cognitive ability in particular, it is important to note a couple more things about tacit knowledge. First, it is often not located in the brain, but e.g. in the muscles: the feedback from the effects of an action leads directly to corrective action without passing through the central nervous system at all. Second: most "cognitive" activity is not merely unverbalised but feeling based … certain aspects of a situation seem somehow to attract, beckon and call attention to themselves. So-called "metacognitive" activities are crucial to this. For example, one half-consciously "knows" that one does not remember (i.e. does not at this instant *know*) the name of someone one wants to mention in a couple of minutes and so one both sets up a research strategy to retrieve the name and re-schedules one's "planned" intervening speech so that one has time to remember or avoid it … or even that one knows that one *will* know it when the time comes to enunciate it

17 A wider discussion of some of the issues involved in doing this will be found in McKnight, (1995)

18 Tough (1973, 1976, 1977); Sigel (1985, 1986); Sigel and McGillicuddy-Delisi (1984), Tizard and Hughes (1984), McClelland, (1982), and Raven (1980, 1982).

19 Thus, whereas Chan (1981), Tough (1973), Feuerstein (1980), Vygotsky (1978, 1981) and Raven (1980) have shown that parents promote the development of the ability to perceive and think clearly by involving their children in what Feuerstein has called "mediated learning" – i.e. learning in which parents encourage their children to share in their thinking, their agonising, their planning, their delighting, their struggles with moral dilemmas, and in which they join in their children's conceptualising, information seeking, experimenting, monitoring, anticipating, meaning-seeking, meaning-making and delighting in insights – Miller, Kohn and Schooler (1985), Sigel (1986), Stallings and Kaskowitz (1974), and Raven (1980) have shown that didactic teaching actually hinders the growth of this ability.

20 Readers may be puzzled by the assertion, implicit in the previous statement, that measures of outcomes should be related to the objectives, processes, and possible desired and undesired outcomes of the programmes being evaluated. In fact, failure to do these things results in the employment of entirely arbitrary measures that are unlikely to reflect the effects of the programmes. The resulting "evaluations" can then be entirely misleading and may have the most unfortunate – unethical – consequences. Just consider what the effects of adopting only conventional measures in an evaluation of the previously described educational processes in schools and the wider community would be likely to be … or reflect on what the effects of doing just that in evaluations of "progressive education" programmes have actually been. In this context attention may be drawn to the vast international literature which suggests that teaching methods have little effect on pupil outcomes (but c.f. Hattie, above). The fact is that, when we examined the processes occurring in different teachers' classrooms and tailored our evaluations to those processes we were able to show that different teachers' had dramatically different effects on their pupils' self-images, values, and patterns of competence. For a further discussion of these issues see Kazdin (2006), Prieler & Raven (2008), and Raven (2008).

21 It is of interest that the main beneficiaries of these were the community rather than the individuals concerned.

22 Deming (1980) has argued that only 5% of the processes operating in organisations and in their important outcomes can be "measured" in this sense with the result that a focus on the measurable outcomes completely distorts the functioning of the organisation. The disaster which results from a national focus on GDP and a few more economic indicators is plain for all to see.

23 As in our teacher studies, the above is a composite picture derived from combining incidents of effective behaviour observed in many different managers. It is unlikely that any one officer would provide a role model for how to do *all* of these things.

[24] Interestingly enough, because these procedures rely on documenting change at an *item* level, they would serendipitously enable us to move some way toward handling the comprehensiveness problem discussed earlier. It would be easier to insist on adequate sampling of a domain of all possible positive and negative outcomes rather than on accurate measurement of any one dimension within the domain.

25 For a fuller discussion of this form of illuminative research see Hamilton et al. (1977), Parlett (1972, 76), Raven (1980) and Raven (1984).

26 Such as the option to lead one's life in an altogether less destructive, but still satisfying, way.

27 Those who are ready to take the plunge may care to note that something still deeper is implied by the term "Learning Society". It is what the system, qua system, (autopoietically) learns that it is most important to influence – not the learning of the individuals within it.

28 The requisite developments are fully discussed in Chapter 8 of *Managing Education for Effective Schooling* (Raven, 1994) but especial reference may again be made to Kanter's (1985) notion of "parallel organisation activity".

29 See Flynn (1991, 2008) for evidence of the importance of all of these things.

30 See also Lane (1991) and Marks et al (2006).

31 The creation of this senseless work is supported by endless myths (such as the belief in the efficiency of the "market process" or the value of education) and constitutes "the economic system" itself. One may well ask what a society without this senseless work would look like. How would one give meaning to people's lives? How would they gain access to the wherewithal required to pursue a decent way of life?

32 More specifically, I have shown that psychologists have failed to contribute adequately to our understandings of, among other things:

- The nature and varieties of competence, and especially professional competence.
- Ways in which the components of competence can be nurtured.
- The procedures to be adopted to assess the varieties of competence.
- The barriers which deflect educational institutions from their goals.
- The arrangements required to run public sector activities (e.g. the educational system) effectively.
- The dangers inherent in reductionist science, especially as they express themselves in evaluations of individuals, educational and social processes, and interventions in ecological processes.
- The changes that need to be introduced into evaluations of research proposals and the products of research if we are to move away from positivistic, reductionist, science.
- The socio-cybernetic processes which primarily control the operation of society, the behaviour of individuals within it, and, more specifically, generally undermine well intentioned public policy.
- The societal management (socio-cybernetic, governance) arrangements which are required to create an innovative society which will operate in the long term public interest.
- The implications of all these things for our understanding of *professional* competence and the arrangements needed to promote its development.

33 I would personally argue that ethics is mainly concerned with questions stemming from conflicts between the long-term social consequences of actions and short term personal gains. Clarification of these issues thus falls within the remit of psychologists involved in evaluation studies. However, Flynn (2000) has provided us with an incredibly thorough treatise reviewing earlier thinking on this topic.

34 Put another way, what we see in front of us is a classical Schon-type situation. Widespread observation that many psychologists are not performing very effectively – not doing what they are expected to do (and are perhaps unable to do) - or not adopting the latest fashion leads to regulations requiring involvement in compulsory professional development activities. But, in reality, their failures are not mainly due to unfamiliarity with the currently accepted technico-rational frameworks of thought in the area. As we have seen, those frameworks are often inappropriate. Instead, what is needed is intervention in the very processes which constrain their work and result in the perpetuation of inappropriate thoughtways and procedures. Yet promoting such interventions is likely to be considered outwith their domain of professional competence and thus 'unprofessional'.

35 Actually, this last discovery had been made earlier.